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THE MILITARY PSYCHIATRIST AT WORK

By WILLIAM C. PORTER

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The duties of a military psychiatrist properly begin at the place where he first meets the candidate for military service. But his interest actually does not confine itself to the army. Psychiatry being the art of understanding human behavior, the military psychiatrist must interest himself in the sociological background from which the candidate comes and, in this latter day, in which militarized and non-militarized members of the population share the burden of preparation for defense and offense and alike suffer the effects of total warfare, he must interest himself in the mental stability of the whole population. The latter function will doubtless be discharged by non-militarized psychiatric workers and, indeed, is receiving the careful attention of special groups within the National Research Council and elsewhere. The mental health of workers in productive industries engaged in national defense work is a problem under study by representative psychiatric groups. The effects of evacuation of children away from their parents has been a psychiatric problem in England and the experience there will bear careful study in this country. The effects of enemy propaganda upon civilians and the armed forces and an understanding of the causes of panic-reactions are legitimate and pertinent subjects for investigation by both civilian and military psychiatrists.

The first appearance of a candidate for the army is either at the local draft board of the Selective Service System or, if a volunteer, at an army recruiting station. A civilian physician is attached to each local board for the purpose of determining a registrant's physical and mental fitness for military service. While ordinarily he is not a psychiatrist, his job is one requiring profound insight into human character and human behavior, as well as a thorough-going knowledge of the science and art of medical diagnosis. Withal, he must be a diplomat and possess tact to a superlative degree. It is the responsibility of the medical examiner at each echelon, whether local board, medical advisory board, induction station or recruiting station, to select men who are peculiarly vocationally suited to the military service. The military vocation is one that requires a special type of individual. The ideal type is one who can and does get along well with other men; is not over ambitious along lines foreign to the army vocation; is not too deeply attached to any person or group of persons or to a particular locale; does not have to depend upon stereotyped props or circumstances in order to adjust himself without too much unhappiness; is not hypersensitive in the emotional field; has enough native intelligence to understand and carry out orders; is physically healthy; is able to enjoy athletic activities; does not resent the necessity of superior authority and has a spirit of adventure and a healthy curiosity about people and things foreign to his local culture. This description probably applies to the man who will adapt himself to the service with a minimum of mental effort. Deviants from the ideal type will also succeed to the degree in which they possess the ability to adapt themselves to new conditions and experiences, either because of a sound constitutional makeup or because they have developed the habit of successfully doing so in ordinary life. Accordingly any individual who, although not deficient in intelligence, nevertheless has shown an inability to adapt himself in an adult, socially-acceptable manner to the demands of ordinary life should be regarded as a psychopathic personality of the inadequate type and should not be chosen for military training. Other psychopaths may show emotional instability and impulsiveness and are not dependable under stress. One must regard the psychopath as an individual who has anatomical or morphological deficiencies or stigmata with a resulting malfunctioning of his biological mechanism and peculiar emotional and intellectual variations

from the average normal way of reacting to social demands. As outlined in Circular Letter No. 19, issued by The Surgeon General of the Army, the psychopathy may be manifested in a variety of ways. Much has been written about the psychopath, everyone concedes his nuisance value, but little has been done about him. No formula has yet been found for insuring the detection of him until he is in a position to upset the morale and discipline of his fellows, cause his unit commander to grow old before his time and to bring anguish and mortification to the medical officer who is unable to dispose of him without either violating the rules of good psychiatric practice or being accused of ruining military discipline by allowing the psychopath to terminate his military service of his own volition. While he is being observed and "boarded," he occupies a hospital bed for an inordinate period or, if placed in confinement in the guard house, is the leader of group revolts and is the despair of the prison officer. If he is returned to a duty status pending action by a board of officers under Section VIII, Army Regulations 615-360 (discharge for inaptness or habits and traits of character which unfit the man for military service), he brags of his ability to malinger his way out of the army and is an infectious focus of insubordination and dissatisfaction.

Another charge against the psychopath in the military service is the frequent gestures of suicide made by him. Suicide in the service, if successful—and sometimes even a psychopath is sincere in his attempt or he unintentionally succeeds—is a serious matter of concern to the line officer, as well as to the medical officer. The newspaper reader in general and the relatives of the patient in particular are apt to attribute the suicide to intolerable abuse or too-rigid discipline in the military service, rather than to an inherent weakness in the victim. A psychopath soon learns that one way to earn hospitalization and probable separation from the service is to make a suicidal attempt or suicidal threats. He is fertile soil on which a neurosis may develop. As will be discussed later, the elements of anticipation of hardship, injury or death; disgust; suggestion and desire for compensation, work potently in this type and account for the large percentage of "neuropathic predisposition" present in war neurosis.

Notwithstanding the rejection by the draft boards, 1917-18, of 15.08 men per 1000 registrants for psychopathy and allied constitutional mental defects, 5146 soldiers were admitted to the United States Army hospitals for constitutional psychopathic states during the World War. Based on pre-war experience, it is estimated that had it not been for the elimination of so many psychopaths, mentally deficients and pre-psychotics by the draft boards and by psychiatric boards at the training camps, the A. E. F. would have had 240,000 deserters or general prisoners. Instead, 1700 men or less than 1/10 of 1 per cent were returned to the United States as general prisoners.

But even in 1915 the problem of the psychopath was not new. King [1] made a study of military delinquency in the United States Army in that year and showed that from 1908 to 1913 12 per cent of the separations from the service were for military delinquency and that in a study of this class he found 20 per cent to be psychopaths and 17 per cent to have been habitual drunkards prior to enlistment.

Bringing the statement up to date, during the year ending June 30, 1939,[2] the mean strength of the peace-time United States Army was 182,815 and there were 2509 admissions to hospital for nervous and mental disease (13.72 per 1000 men in service), with 112,746 days lost from duty, a non-effective rate of 1.69. Of this group, the constitutional psychopaths numbered 493, a rate of 2.70 per 1000 men in service, with 14,477 days lost from duty. The total number of days lost from duty by the psychopaths was exceeded within the neuropsychiatric group only by the schizophrenics (28,011 days lost) and the psychoneuroses (20,479 days lost). The large number of days lost by the psychiatric patients is explained by the necessarily prolonged process of securing separation and disposition of this class. The figures are cited to encourage each examiner to eliminate at the source each person who is obviously unfit for military service.

[1] King, Edgar: The military delinquent. The Military Surgeon, 36: 574, December, 1915.

[2] Annual Report of The Surgeon General, United States Army, 1939.

At this point it may be profitable to estimate the burden which neuropsychiatric defects places upon the military service and upon the tax-payers as a result of military service. During the World War I draft 2,754,922 men were examined by local draft boards. Four hundred sixty-eight defective men per 1000 examined, and 557 defects per 1000 men examined, were found. Not all defectives were absolutely rejected for military service. Many were passed to training camps. There many were discharged from the service within a comparatively short period, but they became beneficiaries of the government under existing or subsequent veteran relief legislation. During the early part of the war many mentally unfit individuals reached the A. E. F. In July, 1918, General Pershing transmitted the following cablegram to the War Department: "Prevalence of mental disorders in replacement troops recently received suggests urgent importance of intensive efforts in eliminating mentally unfit from organization of the new draft prior to departure from the United States." It is the expressed opinion of the editors of the volume on neuropsychiatry of *The History of the Medical Department of the United States Army in the World War,* that it would have been advisable to have totally rejected all mentally unfit individuals at the draft boards rather than to have selected some of them for full or even limited military service.

The burden of mental defect in the British and Canadian armies reached staggering proportions after 1916, when, beginning with the retreat from the Somme, war neurosis (called "shell shock") at times was almost epidemic. Due to the work of the neuropsychiatric examination boards in the United States, the American Expeditionary Force had a far smaller incidence of nervous and mental casualties than did the armies of our allies. Even so, 110,137 neuropsychiatric casualties occurred in the United States Army from April 1, 1917, to December 31, 1919, a rate of 25.68 per 1000 men in service for the whole army, a rate of 32.96 per 1000 for troops in the United States and 17.75 per 1000 for the A. E. F. It has been estimated that had it not been for the psychiatric selecting-out process, 40,000 more cases of war neurosis would have occurred in the A. E. F. than did occur. Due to difficulties and complexities in disposition from the military service of neuropsychiatrically disabled soldiers, the average hospitalization during the World War was approximately 45 days and it is at present no shorter. If the World War experience were now effective, it would be necessary for the United States Army of 1,400,000 men to maintain 4432 beds constantly immobilized by neuropsychiatric casualties. It would be impossible to use this number of beds for any other purpose. Manifestly it is important from the medical standpoint to cut down the number of potential neuropsychiatric casualties. From 1923 to 1940 the Veterans Administration has expended $641,857,704 to veterans of the World War for neuropsychiatric disabilities. During the fiscal year ending June 30, 1940, there were 68,727 beneficiaries of this clinical type on the payment rolls and the sum of $41,889,360 was disbursed to them as disability awards. Not only is compensation paid but payment for permanent total disability under government insurance contracts swells the total. From 1926 to 1940, inclusive, the Veterans Administration expended for hospitalization of neuropsychiatric patients the sum of $282,679,909. Thus the total expense to date of this class of World War beneficiaries has been approximately one billion dollars. Of the 90 Veterans Facilities, 27 are exclusively for nervous and mental diseases. The population is 33,016, over one-half of the total hospital population under the care of the Veterans Administration. It is estimated that it has cost the United States an average of $30,000 to care for a service neuropsychiatric disability from inception to cure or death.[3] The importance of excluding the actual or potential nervous or mental victim from the military service is evident.

Many psychopathic individuals get along in civil life without too much conflict or without becoming more than passing behavior problems in the community. The schizoid types learn ways and means of avoiding open ruptures with their environment. They have mental conflicts, but by means of one escape

[3] Cooley, Martin: The Selective Service and the Veterans Administration. Statements before Selectice Service Seminar, Washington, D. C., January 2, 1941.

mechanism or another, by means of one familiar prop or another, they do not become overt social misfits and do not become intolerable. They may retreat to introversion, prolonged periods of inactivity or may wander from one place to another, but they do not require prolonged hospitalization at the expense of the state or local government. But when they find themselves in that quite rigidly molded environment called the army, they cannot accept the regimentation, the subordination, the loss of self-prestige, the increased responsibility, the physical stress and the mental hazards of training and of modern warfare without so much mental conflict as to result in breakdown. In justice to the individual, who might continue in civil life without prolonged overt mental disorder, and to society, whose duty it is to segregate him and treat him when he shall have broken down, and to the civilian national defense activities in which he might be engaged with some degree of efficiency, the mentally disqualified should be excluded from military service.

The army can use many individuals of limited native intelligence, but it is unable to use those who fall below a certain intelligence quotient. There are places in every military organization, as there are in most non-military organizations, for hewers of wood and drawers of water, but there is no assurance that a soldier of low intelligence will automatically find such a job. His defect may escape early recognition and he may drift to a detail where by his lack of native intelligence, the unit may be placed in jeopardy or a piece of valuable mechanical equipment be ruined. During the World War over 13,000 cases of mental deficiency were admitted to hospital for disposition, the rate for the whole army being 3.17 per 1000 men in service. Due to careful elimination in the United States the rate in the A. E. F. was only 0.82 per 1000. The present regulations contemplate that individuals with a mental age below 10 be regarded as unsuited for the service. But all examiners are urged to regard the history of behavior disorder due to mental instability and defective judgment accompanying the limited native intelligence as of more importance than the results of any formal psychometric test. The instructions in Circular Letter No. 19 are clear on this point.

During the World War it was found that epileptics were unduly anxious to enter the service and in many cases made every effort to conceal their disabilities. This fact is explained by the desire of the epileptic to be accepted as a useful social agent, his attacks of unconsciousness having barred him from normal participation in general and industrial activities in his home community. Fortunately, his disability usually becomes manifest within a short time after his entry into the military service and he is discharged. However, he occupies a hospital bed for a long time before such discharge and disposition can become effective, and his acceptance has proved to be expensive. The danger to a command of a person subject to a convulsive disorder or periods of unconsciousness from any cause is self-evident. Such a person may not present any manifest scars on tongue or body, and he may present none of the personality changes characteristically epileptic. A history from any source indicating that the candidate has had repeated fainting spells or lapses of consciousness, whether accompanied or not by motor convulsions, should call for investigation of the past history of the individual before acceptance. The local board physician is often in the particularly advantageous position of having knowledge of such individuals in his community. No person subject to convulsive disorder is helped by service in the army no matter how patriotic his motives for seeking it. On the other hand, the danger of serious injury to himself or others or to equipment is greatly enhanced.

This is not the proper place for a full discussion of the neuroses of war. During and following the first World War a tremendous literature on this subject accumulated. By 1924 more than 4000 articles had been published. Since that time the physiologists, nutrition investigators and the neuropsychiatrists approaching the subject from the psychoanalytic, psychobiological and psychosomatic viewpoints have added greatly to our knowledge of war neuroses by deeper study of the psychoneuroses of peacetime, especially the traumatic neuroses and the effects of fatigue. It would give one

a feeling of comfortable satisfaction if one were able to view the causation, development and treatment of the neuroses of war as being identical with those occurring under other conditions. It is true that a considerable number of neurotic types of reaction occur in any military force which seem to bear no relation to any actual or anticipated combat conditions. It is said that there have been some such in the British forces during the present war and certainly, during the first World War there were many psychoneuroses in soldiers who were definitely classified as fit for limited service in the United States and who had no expectation of being sent overseas, and there were a considerable number of neuroses developing both in this country and overseas behind the combat zone, which were classified as anticipation neurosis. It was noted that this class of cases showed high incidence of history of pre-service neurotic manifestations or personality makeup definitely predisposing to mental disorder.

The first World War had certain features which may not, and probably will not, be repeated in great wars of the near future. The opposing forces rapidly became immobilized and were stalemated in hundreds of miles of trenches in double lines facing each other with an extent of terrain between, known as "No Man's Land," which was covered by barbed wire and other military obstacles and often by the rotting bodies of animals and men. The trenches were alive with rats and vermin, the sanitation was often of the crudest variety or absent, food was brought forward under great difficulties and was often irregular, relieving units were often delayed, fear of the unknown, of what might happen within the hour, was constantly present. These conditions were different from those of a mobile type of warfare, where events succeed one another with reasonable rapidity and something is happening even if that something is terrible and horrific.

It is a matter of history that war neurosis did not occur in any marked degree when an outfit was advancing or when it was victorious. It occurred during retreats or as a result of the terrible mental strains, fatigue and food deprivation incident to trench-warfare. It is true that there were a certain number of so-called anticipation neuroses in training camps in the United States and in other countries at war, but these were mostly of the neurasthenic and hypochondriac types and traumatic neuroses after injuries, which did not differ in etiology or symptomatology from those seen in peace-time. The feature that marked these cases apart was the fact that the government was liable for their occurrence and would be responsible for the care of the individual affected. Many of these individuals had incipient symptoms of neurosis while in camps in the United States, yet recovered sufficiently to go overseas. On the way over or while in concentration camps in France, the symptoms bloomed out again and became a well defined neurosis. This group was never a large one in the A. E. F.; forming less than 10 per cent of the total number of neurosis casualties.[4] Notwithstanding the fact that nearly all the writers during the early days of the war stressed the importance of neuropathic inheritance and constitutional predisposition, a candid review of the later literature leads to the conclusion that it can be regarded as a probable factor in only from 2 to 5 per cent of the cases of neuroses in the combat zone and in only a small percentage of such patients could a psychopathic personality or a history of pre-service neurotic symptoms be demonstrated. The careful elimination of large numbers of obviously psychopathic and nervously-inclined soldiers at the training camps in the United States by the neuropsychiatric examiners resulted in a greatly lowered percentage of potential mental hazards reaching the A. E. F. Some 72,000 men (or 2.1 per cent of all examined) were excluded by the draft boards and at training camps, for nervous and mental disease. The likelihood is that in wars of the immediate future mobile warfare involving swift movement and highly mechanized arms will be the rule. New mental hazards will be present and their effect upon troops is at present unpredictable. The particular type of stress inherent in trench warfare will probably not obtain. Substituted for it are the hazards of terror-producing airplane bombing, wide use of mechanized offensive agents, rapid-fire weapons, swift advances and surprise attacks. So

[4] Schwab, S. I.: The war neuroses as physiological conservations. Nat. Com. for Mental Hygiene, 1919.

it is unsafe to predict just what type of mental reaction will occur in susceptible individuals, or in what numbers. But it seems reasonable to suppose that anxiety reactions and exhaustion states will occur especially in retreating units or under conditions where avitaminosis or extreme fatigue occur. It is significant that the first marked evidence of war neurosis (or "shell shock") in the British forces in the first World War occurred during the retreat from the Somme in July 1916. It has been popular to ascribe this incidence to the mental attitude of the soldiers engaged, but it now seems more logical to believe that the physiological imbalance incident to excessive fatigue was the principal factor at work. This viewpoint does not preclude consideration of the emotional factors. One who is fatigued is depressed, one who is depressed is highly suggestible. Here the rôle of the endocrines, notably the thyroid and adrenals, is important. So in war neurosis we have not only the psychogenic factors of fear, doubt, discouragement and suggestion, which in constitutionally predisposed individuals or in those who have previously found solution of mental conflicts in a neurosis are sufficient, with or without fatigue, to develop a mental disorder, but under conditions of extreme fatigue and exhaustion, there are added biochemical and endocrine factors, which produce a mental breakdown of neurotic-like character in even the best type of soldier. The British experience in the retreat from Dunkirk last year illustrates this. Before that time there was a small incidence of neurosis with etiology, symptomatology and course no different from the psychoneurosis of civil life. Such information as is available would indicate that as a result of the German attack in Flanders and the evacuation of the British Expeditionary Force cases of acute neurosis were admitted to hospitals, which were distinct from those seen prior to that time in this war.[5] During the early days such men as broke down were those who were manifestly constitutionally predisposed and who manifestly lacked stamina. They showed psychoneurotic manifestations differing in no essential from those seen in peace time. Actual fighting was not necessary to bring on the neurosis. But the retreat from Dunkirk showed that men of reasonably sound personality may break if the strain is sufficiently severe. This observation coincides with the experience of the armies during the first World War. However, even this group showed an excessive proportion of men who had suffered from nervous troubles in earlier life, and an excessive frequency of psychiatric disorder in near blood relations. An accumulation of strains, viz., bodily danger, continuous exertion, loss of sleep, insufficiency and irregularity of meals, intermittent but recurrent bombardment and the sight of comrades and civilian refugees being killed around them, brought on the neurosis. The fact that it was a retreat with no possibility of retaliation on the enemy is an important etiological consideration. The clinical picture is said to have been surprisingly uniform. The whole attitude of the body was one of tension and anxiety or apathy. A coarse irregular tremor of the hands was common and there was often a resemblance to a Parkinsonian syndrome. The deep reflexes were usually exaggerated. Insomnia, terrifying dreams, a feeling of unrest and a tendency to be startled by a slight noise, especially that of an airplane, were usually present, as well as retrograde amnesia. Hysterical convulsions, twilight states and air swallowing were found in a few cases. Adequate sleep, rest, food and ample fluids brought about striking improvement, but how permanent and how complete recovery has been is problematical.

The above description will probably closely fit the acute psychoneurotic casualties to be expected under similar conditions in the type of warfare now being waged abroad. Emphasis is placed on the fact that war neurosis differs from peace-time psychoneurosis in that the incidence, onset and coloring of the former is determined by military conditions and that war neuroses differ among themselves according to the particular type of warfare being engaged in. In considering the fatigue state and its attendant neurotic-like behavior, one cannot ignore the recent work of the physiologists showing that fatigue is caused or accompanied by a disturbance in lactic acid, glycogen and CO_2 metabolism with resultant

[5] Sargant, W., and Slater, E.: Acute war neurosis. Lancet 2, 1-2, July 6, 1940.

partial failure of the circulatory and respiratory systems to meet the demands and an anoxemia of the cortical cells. It is recognized that hypovitaminosis, especially that due to B_1 deficiency is an important cause of fatigue. The supplying of an adequate, balanced diet to soldiers in trenches and under such conditions as obtained during the retreat from Dunkirk is impossible or, at least, uncertain. The therapeutic efficacy of restorative therapy is striking.

It will thus be seen that it will probably be impossible to eliminate from the army at either the enlistment or the training stage all soldiers who will neurotically break down under conditions of extreme combat stress. But if the examiner will scrutinize carefully and give due weight to a history of neurotic-like breakdown prior to entry into service; will consider a bad inheritance, but not be swayed unduly by it, unless the individual also shows neurotic or psychopathic traits; and will be on the look-out for manifest psychopaths and those who show the abnormalities listed in paragraph 5 of Circular Letter No. 19, a large percentage of those who might develop neurosis will be eliminated.

While very little information regarding the British experience in their present effort is as yet available, the Canadian experience [6] is enlightening. Of the 200 cases studied, 34 had been returned as ineffectives from overseas. The whole group had had 326 admissions and had spent 8616 days in hospital. A history of unsuccessful industrial adjustment was present in 51 per cent of cases, principally in the psychopathic class, as one might expect. Thirty-five cases gave history of treatment for neurotic conditions prior to enlistment. In view of the proposed efforts of the United States Selective Service System to take advantage of social service histories at the local board stage, the following quotation is significant. "In Ontario, we have available a complete list of all males of military age, who have been either inmates of mental institutions in Ontario, or who have been patients of mental health clinics. Almost no use has been made of this list." The statement is further made as regards Canada, "The majority of these medical officers (members of Medical Boards) acknowledge frankly that they made no endeavor to estimate the recruits' mental capabilities." In the estimation of the writer, the unsuitability for military service should have been obvious at time of enlistment in 34 per cent of the individuals.

The thesis of this article has been that expressed in the foreword to Medical Circular No. 1 of the Selective Service System: "Military life requires that the soldier shall be able to live comfortably in continued close contact with a variegated group of other men. He cannot depend on any self-evolved protective mechanism that sets him apart from his fellows. Military and naval experience is in favor of excluding from the armed forces all persons discovered to have mental or personality handicap of any material degree."

[6] Baillie, Wm.: A summary of 200 neurological and psychiatric admissions from the Canadian Army Service Forces. Am. J. Psychiat., 97: 754-779, January, 1941.

THE CLINICAL DIFFERENTIATION OF SENILE AND ARTERIOSCLEROTIC PSYCHOSES[1]

By D. ROTHSCHILD, M.D., Foxborough, Mass.

It is well known that the clinical diagnosis of senile and arteriosclerotic psychoses presents many difficulties. Experiences in obtaining material for anatomic studies(1) have served to stress this point, for it was observed that mistakes occurred frequently, not only in differentiating between senile and arteriosclerotic disorders but in distinguishing them from a variety of other psychoses. These observations have extended over a period of more than ten years and are probably representative of the situation in many if not most hospitals for mental disease. One may be inclined to think that there is little need for separating senile dementia from arteriosclerotic psychoses, inasmuch as they seem closely related. Such a tendency should be resisted for a number of reasons. The two conditions possess different anatomic and pathogenetic features, and it is by no means certain that the same etiologic factors are operative in them. Their courses are often dissimilar. A lack of clarity in describing their symptomatology will increase the danger of confusion with mental illnesses of an entirely different nature. The great importance of the whole subject has recently been emphasized by Dayton(2), who stated that psychoses of the aged now appear as the leading problems of psychiatry, with senile and arteriosclerotic disorders showing a higher incidence than all other psychoses combined.

Since the pioneer work of early writers (3), our diagnostic criteria in the senile and arteriosclerotic psychoses have been handed down more or less traditionally. While it is possible that the nature of the material precludes clearer delineation of these disorders, a critical re-examination of the data is needed from time to time. New facts may be discovered; already known points of practical importance may be forgotten or overlooked, with a consequent blurring of the boundary lines of the two conditions. By using only anatomically verified cases, reliable outlines of their clinical pictures can be established and comparisons made. In the present study, an examination of this type has been undertaken in an attempt to determine whether senile and arteriosclerotic psychoses can be delimited sharply enough to permit greater accuracy in diagnosis by ordinary clinical methods.

Thirty-one cases of senile dementia (23 female and 8 male patients) and 29 cases of arteriosclerotic psychoses (22 male and 7 female patients) were studied. In all instances the diagnosis was established by gross and microscopic examination of the brain. The post-mortem observations indicated that pure forms of senile and arteriosclerotic changes occurred less frequently than mixtures of these processes. Since it is possible that such mixtures may be responsible for some of the difficulties in diagnosis, the clinical data were correlated with the cerebral alterations, the cases being classified anatomically into the following groups:

Senile psychoses		
Group I.	Pure forms	13 cases
Group II.	With slight or very slight cerebral arteriosclerosis.	7 cases
Group III.	With moderate or considerable cerebral arteriosclerosis	11 cases
Arteriosclerotic psychoses		
Group IV.	Pure forms	14 cases
Group V.	With slight or very slight senile changes	8 cases
Group VI.	With moderate or considerable senile changes	7 cases

For convenience of discussion these groups will be referred to by the numbers given above.

Stress was laid on the resemblances and differences between the two disorders, and a broad survey of the whole illness was made rather than a detailed study of any special features. In a few instances information concerning the development of the psychosis was meagre or unreliable. Such cases were included, for the object of the present study

[1] Read at the ninety-sixth annual meeting of The American Psychiatric Association, Cincinnati, Ohio, May 20-24, 1940.

From the Foxborough State Hospital.

is to determine whether greater diagnostic precision can be attained, not under ideal circumstances but under the actual working conditions existing in a state hospital for mental diseases.

Age of Onset and Duration of Illness. Certain general tendencies which differed somewhat in the various groups were revealed by a scrutiny of the ages of the patients and the duration of the illness. The figures were as follows:

	Age of onset			Duration of illness		
	Earliest age	Latest age	Average age	Shortest illness	Longest illness	Average duration
Senile psychoses						
Group I	64	84	76	7 mos.	10 yrs.	4 yrs.
Group II	65	98	77	1.2 yrs.	11 yrs.	5.5 yrs.
Group III	65	81	72	8 mos.	10 yrs.	4.9 yrs.
Arteriosclerotic psychoses						
Group IV	48	80	63	1 day	8 yrs.	2.4 yrs.
Group V	46	77	63	16 days	16 yrs.	3.8 yrs.
Group VI	66	86	74	1 mo.	8 yrs.	4.2 yrs.

It will be noted that the mental illness tends to begin later and to last longer in senile dementia than in arteriosclerotic psychoses. In all cases of the former condition the average age of onset was 75 years and the average duration of the illness was 4.7 years; the corresponding results for the whole arteriosclerotic group were 66 years and 3.4 years respectively. The differences were most marked in anatomically pure forms of the two disorders. When arteriosclerotic psychoses were complicated by noteworthy senile changes (Group VI) the figures became similar to those for senile dementia, but arteriosclerotic admixtures in the cases of senile psychosis (Group III) had only a slight influence. A point of interest is that in 8 patients with arteriosclerotic psychoses the whole duration of the illness was less than 6 months, whereas the shortest illness among the senile patients covered a span of 7 months.

The Onset of the Psychosis.—In 8 cases of senile dementia psychologic or physical stress seemed to act as a precipitating factor. These factors included deaths of close relatives, financial difficulties, less frequently worry concerning somatic disease such as cataract and cancer, and severe injuries which may have produced cerebral concussion. Among the cases of arteriosclerotic psychoses, obvious precipitating factors were less common; in one instance an attack of pneumonia and in another a head injury seemed to initiate the mental disturbances. In both psychoses the mental illness was often preceded by a gradual diminution of physical and mental capacity consistent with normal old age. The impression was obtained that the senile patients tended to show this phenomenon a little more frequently than the arteriosclerotic patients.

The mental illness began gradually in almost all patients with senile dementia and in less than half the patients with arteriosclerotic psychoses. (Table I.) A subacute onset was observed in 2 cases of the former disorder and in 4 of the latter. A sudden onset marked by an acute attack of confusion was noted in 10 patients with arteriosclerotic psychoses; this was associated with definite neurologic indications of a cerebral insult in 4 cases, an attack of cardiac weakness in 2 cases and a series of convulsive seizures in one case. A similar type of onset following a paralytic stroke occurred in a single case of senile dementia belonging to Group III.

Early Symptoms and Course of the Illness before Hospitalization.—Regardless of the manner in which the mental disturbances started, the patients with arteriosclerotic psychoses usually showed one or more of the following features: headache, dizziness, syncopal attacks, convulsive seizures, symptoms of cardiac decompensation and apoplectiform attacks. They often preceded the mental symptoms but in some cases occurred later. Their frequency is indicated in Table I. Excluding a case in which no information was available, only a single member of Groups IV and V failed to display at least one of these features. Among the patients

with senile dementia, the sole example of symptoms of this type was an apoplectic attack in the case mentioned in the foregoing paragraph.

When the onset was gradual or subacute, the two psychoses showed a number of similarities. In both conditions the first mental symptoms were usually those of gradual intellectual failure, manifested by loss of efficiency in everyday tasks, forgetfulness and the like. Irritable and quarrelsome behavior, sometimes leading to threatening and violent actions, was often in the foreground. An exaggeration of previous traits of personality was occasionally reported as the earliest mental change. Carelessness in habits of toilet, though seldom observed as an early symptom, tended to occur more frequently in senile patients. A lowering of moral standards leading to sexual irregularities, alcoholic excesses or dishonest practices was described in a few members of both groups but was commoner among patients with arteriosclerotic psychoses.

On the other hand, certain differences were noted in the mental pictures. The arteriosclerotic patients frequently expressed subjective complaints, such as weakness, fatigue and vague somatic feelings of an unpleasant nature. Depressive feelings and a fear of failing mental and physical powers were common, and pronounced suicidal tendencies were displayed by 4 patients. Outspoken features of this type were rarely encountered in the senile cases. Emotional instability with easily provoked and uncontrollable outbreaks of weeping or laughter was described in 5 arteriosclerotic patients. Ideas of mistreatment were often observed in both psychoses, but well elaborated and persistent delusions occurred only among patients with senile dementia.

In the senile patients the intellectual impairment grew steadily more marked, though the rate of progress varied greatly from case to case; thus, the patients had been ill for periods ranging from 5 months to 10 years when they arrived at the hospital. Psychoses which progressed slowly were also observed in cases of cerebral arteriosclerosis, but a stormy course was common, 13 patients entering the hospital with illnesses of less than six months' duration. Furthermore, in arteriosclerotic conditions sudden attacks of confusion were apt to occur at any point in the course of the illness. They ranged from transitory episodes of a few hours' duration to prolonged confused or delirious states lasting for several months. Only 8 patients, including 3 belonging to Group IV, failed to exhibit such attacks at one time or another prior to hospitalization. They were commonly but by no means always attributed to apoplectic attacks, though they did not as a rule lead to distinct neurologic disabilities.

TABLE I

DATA ON THE MANNER OF ONSET AND CERTAIN EARLY SYMPTOMS IN SENILE AND ARTERIOSCLEROTIC PSYCHOSES

	Senile psychoses—number of cases			Arteriosclerotic psychoses—number of cases		
	Group I	Group II	Group III	Group IV	Group V	Group VI
Gradual onset	11	7	7	6	4	2
Subacute onset	1	0	1	2	1	1
Acute onset	0	0	1	5	2	3
Onset unknown	1	0	2	1	1	1
Early symptoms						
Headache	0	0	0	5	3	0
Dizziness	0	0	0	6	3	1
Syncopal attacks	0	0	0	3	1	1
Apoplectiform attacks	0	0	1	6	4	3
Cardiac attacks	0	0	0	4	3	0
Convulsions	0	0	0	3	1	0

Observations During the Period of Hospitalization.—On entering hospital all the patients with senile dementia, except the paranoid types, showed pronounced intellectual impairment, as indicated by disorientation for time and place, rambling and incoherent speech, diffuse memory defect, impaired

comprehension and the like. Prominent in many cases were additional features, such as restlessness, fearful and agitated states, hallucinatory and delirious episodes and noisy and threatening conduct, occurring singly or in varying combinations; mild euphoric states with or without a tendency to fabricate were observed less frequently, and one patient presented a manic-like picture. Although some of these features were apt to fluctuate greatly or even subside completely, the intellectual disturbances grew steadily more severe without any abrupt changes, apart from minor variations in one or two cases complicated by vascular disease.

Seven patients displayed paranoid forms of senile dementia, the delusional features of which are too well known to require description here. These patients usually exhibited only a slight or moderate defect of memory on admission to the hospital, and as a rule they were partially or completely oriented. Deterioration progressed less rapidly than in the other cases but eventually became pronounced. Unless death from extraneous causes occurred in the earlier stages of the illness, all patients finally presented the familiar senile picture of a helpless vegetative state associated with profound impairment of all mental activity.

In 19 cases of arteriosclerotic psychoses acute states of confusion with or without hallucinatory phenomena were observed on admission. These symptoms subsided in about half the cases and had a fatal termination in the remaining half. Otherwise the patients showed a defect of memory, which was apt to be uneven and of moderate severity, and they were generally in partial or good contact with their surroundings. As a rule, they displayed irritable, complaining, depressed or agitated tendencies. Some members of Group VI exhibited more pronounced disturbances of memory, comprehension and orientation. One patient in Group IV had a remission which enabled him to return to his home for one year and several others had less complete remissions of briefer duration. Later attacks of confusion were common, but did not occur in all cases. In a few instances the acute symptoms subsided quickly, leaving the patient in a state of mild intellectual impairment, which remained stationary until the illness was terminated by a sudden cerebral insult. In most cases, however, the disturbances tended to increase eventually, regardless of the presence or absence of acute episodes or of senile complications, and occasionally a picture of advanced deterioration not unlike that of senile dementia was produced in the late stages of the disorder.

Neurologic Changes.—In both psychoses tremors, changeable muscular rigidity and an uncertain gait were frequently observed. A clear-cut parkinsonian picture was not encountered among the senile patients; one arteriosclerotic patient in Group IV showed an outspoken syndrome of this type, and 2 presented less well developed parkinsonism. Two senile patients in Group III exhibited one-sided indications of focal cerebral damage on admission to the hospital, but none developed hemiplegic phenomena later.

Among the cases of arteriosclerotic psychoses, 4 patients entered the hospital with symptoms of hemiplegia or hemiparesis (3 cases in Group IV and one in Group V). Aphasic disturbances were noted in one of these cases and in 2 additional cases. A few patients exhibited minor alterations, such as slight facial weakness, sluggish pupillary reactions or exaggerated tendon reflexes. One patient presented a pseudo-bulbar type of speech defect. During the period of hospitalization, hemiplegic attacks occurred in 9 cases, of which 2 belonged in Group IV, 5 in Group V, and 2 in Group VI. These cerebral insults were usually terminal events.

Other Physical Changes.—Changes customarily associated with old age, such as a wrinkled and inelastic skin, arcus senilis and general wasting, were usually though not invariably present in the cases of senile dementia. Similar changes were not uncommon in patients with arteriosclerotic psychoses, but they were seldom pronounced except in members of Group VI. In both psychoses all but 2 patients showed sclerosis of the radial arteries, and as a rule the blood pressure was elevated, high figures occurring only a little more frequently among the arteriosclerotic patients and the senile patients in Group III (Table II). It should be noted that excessively high systolic pressures were equally common in the two disorders, whereas raised

diastolic pressures were more frequent in cerebral arteriosclerosis.

Many patients with arteriosclerotic psychoses showed marked cardiac hypertrophy. Gross irregularity of the heart rate was common and several patients displayed signs of cardiac decompensation on entering the hospital. In contrast, outspoken cardiac abnormalities were seldom noted in cases of senile dementia; pronounced enlargement of the heart was observed in only a few patients, chiefly those with paranoid forms of the psychosis. During hospitalization 12 arteriosclerotic patients had attacks of cardiac weakness, usually with general indications of decompensation. Outspoken attacks of this type were not encountered in cases of senile dementia, though sudden cardiac weakness was occasionally observed as a terminal phenomenon.

Laboratory Observations.—Urinary changes were common in both psychoses; apart from extraneous infections they were usually of a minor nature, tending to be more severe in patients with arteriosclerotic psychoses. The non protein nitrogen content of the blood was determined shortly after admission in 32 cases equally divided between the two disorders. The values were above 50 mg. per 100 cc. in 5 arteriosclerotic patients, whereas no senile patient displayed figures above 40 mg.; in both conditions a rise of the non protein nitrogen was not uncommon in the terminal stages. The sugar content of the blood was within normal limits except in 2 cases of cerebral arteriosclerosis in which diabetes was present. Examination of the spinal fluid by the standard methods failed to reveal any differences between the two psychoses. The Walter bromide test was used in 17 cases. Some of these observations have been discussed in earlier communications(4). The distribution ratio of bromide between blood and cerebrospinal fluid was normal when senile changes occurred in pure form, but the figures were low (that is, indicative of an increased permeability to bromide) in most cases of arteriosclerotic psychoses and in cases of senile dementia complicated by considerable vascular alterations.

Comment

Most of the mistakes in diagnosis encountered in the present study resulted from inability to differentiate between senile and arteriosclerotic psychoses or from failure to recognize other conditions which had been incorrectly classified as senile or arteriosclerotic. It was distinctly less common for either of the two psychoses to be overlooked and mistaken for a third disorder. Since cerebral arteriosclerosis figured more frequently than senile psychoses in all types of error, greater attention will be devoted to it in the following discussion.

Differentiation of Senile and Arteriosclerotic Psychoses.—In a considerable number of cases arteriosclerotic psychoses present a clear-cut and easily recognizable picture, with headache, dizziness and apoplectiform phenomena in the foreground. But such changes were lacking in nearly half the group, and as a rule permanent neurologic disturbances of an outspoken nature did not occur early in the illness. However, there are other early symptoms which are equally charac-

TABLE II

Data on the Blood Pressure in Senile and Arteriosclerotic Psychoses

	Senile psychoses—number of cases			Arteriosclerotic psychoses—number of cases		
	Group I	Group II	Group III	Group IV	Group V	Group VI
Systolic pressure						
Below 150	5	5	2	3	2	2
150-200	4	2	7	7	6	4
Above 200	4	0	2	4	0	1

	All senile groups	All arteriosclerotic groups
Average blood pressure	165 systolic, 83 diastolic.	172 systolic, 95 diastolic.
Range of blood pressures	108-255 systolic. 60-140 diastolic.	110-240 systolic. 42-160 diastolic.

teristic, namely, syncopal attacks, convulsive seizures and cardiac attacks. One may expect to find one or more of the foregoing features in almost all cases, most of the exceptions occurring when large senile admixtures are present. Explosive emotional outbursts might be added as another typical symptom, though they were of less practical aid in diagnosis because they were always associated with neurologic changes plainly pointing to an arteriosclerotic condition.

The importance of cardiac involvement in arteriosclerotic psychoses has not been sufficiently emphasized. Outbreaks of cardiac decompensation may be observed in three cases in which all the other symptoms mentioned in the preceding paragraph were absent. Since almost half the patients had outspoken attacks of cardiac dysfunction at one time or another during the illness, the diagnostic value of such disturbances is obvious.[2]

None of the foregoing phenomena were observed in the senile cases studied here, except for the solitary instance of a hemiplegic insult in a patient whose senile disorder was complicated by cerebral arteriosclerosis. Of course in stressing these differences it is realized that the material on which the present communication is based is not large enough to exclude errors due to chance variations. At the same time, the number of cases seems sufficient to reveal major trends in both psychoses.

Apart from the disturbances already discussed, physical features do not as a rule provide reliable clues. Severe renal or uremic manifestations suggest an arteriosclerotic disorder unless they are terminal phenomena. In both mental diseases the same wide range of blood pressures is noted. Furthermore, high blood pressures occur only a little less frequently in senile patients than in patients with arteriosclerotic psychoses, and sclerosis of the peripheral arteries is observed in almost all cases, regardless of the type of psychosis. In several instances mistakes in diagnosis were traceable to the widespread but incorrect belief that such features point strongly to an arteriosclerotic condition. General physical alterations of a senile nature suggest senile dementia rather than an arteriosclerotic disorder, especially if they are pronounced, but they are by no means rare in the latter condition. Arteriosclerotic mental disease often affects relatively young persons, yet there is so much overlapping of the ages in the two psychoses that this is of little diagnostic help in many cases.

Sudden attacks of confusion are frequently a feature of arteriosclerotic psychoses. However, they cannot always be readily distinguished from the chronic confused states associated with senile dementia, unless their manner of development is known or their tendency to subside reveals their arteriosclerotic basis. Since a fatal outcome is common during such attacks, it may be difficult if not impossible to make a correct diagnosis when an adequate history is not available. A point which may be of aid is that even in states of severe confusion due to arteriosclerotic disease, there may be fleeting periods during which the patient is able to appreciate his true situation more or less completely.

In a smaller number of cases, arteriosclerotic psychoses show a gradual onset which resembles the onset in senile conditions. In such instances early subjective complaints, anxiety concerning impending mental disturbances and even outspoken suicidal tendencies are often prominent. Symptoms of this type are occasionally noted in less pronounced form in senile patients with paranoid manifestations, but are rarely observed in other senile cases. The lack of marked intellectual impairment in the senile paranoid patient may also be reminiscent of an arteriosclerotic disorder. However, well defined paranoid syndromes were not encountered in cases of cerebral arteriosclerosis, though ideas of mistreatment, feelings of jealousy and the like were not uncommon as isolated or temporary symptoms. According to the present study, outspoken and chronic paranoid pictures occurring in elderly persons

[2] Anatomic observations showed that pronounced changes of the heart occurred in the great majority of cases of arteriosclerotic psychoses. In a few cases the cardiac component was conspicuous. Renal disease was sometimes added to the picture, so that it is perhaps more accurate to speak of a cardio-renal component. In other cases this factor was less prominent; in fact, all gradations can be traced until one reaches the opposite extreme, represented by cases without any detectable involvement of the heart.

on an organic basis belong in the sphere of senile disturbances.

In the average case of senile psychosis, the insidious onset in later life and the slow but inexorable increase of intellectual deterioration extending over a period of years provide a picture that can scarcely be mistaken for any other condition. Occasionally the illness begins less insidiously and the downward progress is more rapid, especially when precipitating factors play a role. Certain phenomena, such as restless, agitated and delirious states, may exhibit variations, but the general intellectual impairment is not subject to sudden changes. The course of the disease in the arteriosclerotic group shows greater diversity from case to case, as well as more variable symptoms within the individual clinical picture. The illnesses ranged from brief and stormy episodes with a fatal termination to long drawn out psychoses. In the latter, abrupt fluctuations, quiescent periods, neurologic changes or other features typical of arteriosclerosis are to be expected. The defect of memory is usually diffuse in the senile patient and somewhat uneven and less severe in the arteriosclerotic patient, with memory for remote events relatively well retained in both groups. Fabrications occur with equal frequency in the two conditions. Early changes of personality due to lowering of moral standards are often regarded as typical of senile disorders; the results of this study suggest that they are actually more common in arteriosclerotic psychoses.

With the exception of the paranoid form, the various types of senile psychosis mentioned in the standard classification were not represented in a clear-cut fashion among our cases. Transitions and admixtures of all sorts were observed, and it is questionable whether this classification is of much value clinically.

Patients with the paranoid form of senile psychosis deserve separate consideration, because they stand out from the others by reason of florid delusional features and a relatively well preserved personality. It is interesting to note that the lack of pronounced intellectual involvement is not due to a milder anatomic process. For example, a patient, aged 74, with a paranoid form of senile dementia, died of lobar pneumonia a month after his admission to the hospital. At this time he had been correctly oriented and his memory had shown only slight disturbances. Yet the brain exhibited extensive alterations, which were actually more severe than those found in certain patients with profound mental deterioration.[3] In one or two cases the impression was obtained that the senile alterations may have merely accentuated a paranoid condition which had been developing for many years. The evidence on this point was not decisive, and the foregoing case demonstrates that marked anatomic changes may be present when the absence of obvious signs of intellectual impairment might lead one to doubt whether the psychosis was of an organic type.

From a strictly anatomic viewpoint, pure forms of senile or arteriosclerotic disease occur less frequently than mixtures of the two processes. However, one or the other usually predominates, approximately equal admixtures seldom being observed. In a considerable number of cases the minor condition was insignificant anatomically and of no importance clinically. Even when the disparity was less marked, distinct manifestations of the minor process were sometimes lacking, especially in the senile group with complicating vascular disease. In this group slight fluctuations in the severity of the intellectual disturbances provided a clue to the diagnosis more often than neurologic changes. In cases of arteriosclerotic psychosis, a strong admixture of senile lesions had a greater effect on the clinical picture; the illness tended to occur in the older patients, who were less likely to show distinctive arteriosclerotic symptoms, and the senile component was apt to reveal itself by diffuse and unusually severe mental deterioration or pronounced physical alterations of a senile nature.

In some of the foregoing cases it may be difficult or impossible to make an accurate diagnosis on clinical grounds. Yet in many

[3] It is believed that such discrepancies are traceable to the individual reactions of different persons to the cerebral damage. Thus, the paranoid type of patient possesses a strong capacity to compensate for structural lesions and as a result less deterioration occurs. This aspect of the problem has been discussed elsewhere(1).

instances the major condition can be recognized and the presence of the other process strongly suspected, if not definitely identified. While clinical pictures of a mixed nature are not nearly as common as might be anticipated from the histologic findings, it seems desirable that they should be given a place in the classification of senile and arteriosclerotic psychoses.

One may mention certain additional differences which are perhaps of less immediate diagnostic value but which are of interest from a broader biologic point of view. In this category one may place the distinctly greater frequency of senile psychoses among women and of arteriosclerotic psychoses among men. Carcinomatous growths are not uncommon in senile patients but are apparently rare in arteriosclerotic patients.[4] Diabetes tends to occur in the latter rather than in the former, and the arteriosclerotic patients often show severe kidney damage, a feature which was observed much less frequently in the senile group. Such observations suggest that each disorder is associated with selective tendencies pointing to deep-rooted differences in the nature of the two processes, though with the data now available this must be regarded merely as a lead for further investigation.

Difficulties in Diagnosis Involving Disorders Other Than Senile and Arteriosclerotic Psychoses.—These problems can perhaps best be illustrated by the mistakes that were encountered in the course of the present study. A diagnosis of senile or arteriosclerotic psychoses was made in sixteen cases which failed to show evidence of either condition on anatomic examination. Among the cases wrongly placed in the arteriosclerotic group were 4 patients suffering from toxic or symptomatic psychoses, and in single cases the symptoms were due to a brain tumor, neurosyphilis, Alzheimer's disease, subdural hematoma and a chronic manic state. Among those classified as senile psychoses were 4 patients with toxic psychoses, one with dementia paralytica, one with chronic alcoholic deterioration and one with dementia præcox. It is clear from these observations that almost any mental disorder may be mistaken for a senile or arteriosclerotic process, but discussion will be limited chiefly to the conditions which may ordinarily be expected to give difficulty.[5] In this category toxic or symptomatic psychoses are of greatest importance.

It is understandable that toxic states are sometimes difficult to distinguish from arteriosclerotic psychoses. Both conditions often begin with a sudden attack of confusion or delirium and the diagnosis may depend on discovery of the underlying physical factors, which may not be readily discernible. In psychoses due to cardio-renal disease the difficulties may be especially pronounced, because disturbances of the heart and kidneys commonly play a role in arteriosclerotic psychoses. In some of these cases an evaluation of the exact significance of each factor is largely arbitrary.

The fact that toxic psychoses are just as frequently mistaken for senile dementia seems more surprising, since their clinical pictures are dissimilar. Old persons are probably unusually vulnerable to toxic influences and the somatic process responsible for the mental disorder may not be conspicuous; also, the mental disturbances are apt to last longer and are more likely to have a fatal outcome than in younger patients. At the same time a scrutiny of the data leads to the conviction that the chief source of error is an uncritical attitude towards psychoses of advanced age and a tendency to overlook the possibility that a mental disorder other than senile dementia may be present. For example, in the case of a woman, aged 84, a diagnosis of senile psychosis was made, although the psychosis consisted solely of a sudden attack of confusion which terminated fatally within two weeks. There was a history of prolonged physical failure and postmortem examination disclosed a large and necrotic carcinoma of the stomach, with nothing in the brain to suggest a senile or arteriosclerotic psychosis. Other examples

[4] Carcinomatous growths were found in four cases of senile dementia but none were encountered in the arteriosclerotic group.

[5] As already pointed out, there is less likelihood of overlooking a senile or arteriosclerotic disorder. When this occurred, the illness was usually diagnosed as an undetermined type of organic brain disease, but as a rule the presence of a senile or arteriosclerotic process had been suspected.

of an equally striking nature could be given to illustrate the point that almost any form of mental disease may be labelled as a senile psychosis if it occurs in old age. A similar but less marked tendency to diagnose illnesses indiscriminately as arteriosclerotic is observed in conditions falling within a somewhat earlier age range.

Ordinary neurosyphilis can be readily distinguished from senile and arteriosclerotic disorders by the serologic reactions, even if other features fail to establish the diagnosis, but under unusual circumstances mistakes may occur. Two examples were encountered in the present study. In the case classified with the arteriosclerotic group, it was recognized that the process might be syphilitic, but the patient died before any spinal fluid could be obtained. In the other case, a man, aged 76, had an illness of four years' duration which was diagnosed as senile dementia. The clinical picture was entirely typical of that disorder and there were no neurologic changes pointing to neurosyphilitic involvement. The Hinton test of the blood was negative; the spinal fluid was not examined. The discovery of widespread cerebral lesions characteristic of general paresis came as a complete surprise. It is clear that errors of this type can be avoided only by examination of the spinal fluid in all cases.

Alzheimer's disease resembles senile dementia in many ways, but it occurs at an earlier age than the latter. Other points of difference have been mentioned in previous communications (5). The clinical picture may resemble that of cerebral arteriosclerosis because impure and ill-defined focal neurologic phenomena are often present; yet as a rule, the illness can be readily distinguished from arteriosclerotic conditions by reason of its gradual onset, with diffuse intellectual impairment in the foreground, and its progressive course leading to profound deterioration in all fields. In the case incorrectly attributed to cerebral arteriosclerosis, the patient showed one-sided reflex changes which were distinct enough to suggest a focal lesion on a vascular basis, though otherwise the whole picture was typical of Alzheimer's disease.

The difficulties in differentiating cerebral arteriosclerosis from brain tumor are well known from the writings of a number of authors (6), and therefore do not require discussion. In the case of brain tumor included in the present material, a correct evaluation of the psychosis was obscured by concomitant cerebral arteriosclerosis. It is also well known that subdural hematoma is often unrecognized during life, and it is possible that the disorder is mistaken for cerebral arteriosclerosis more frequently than might be assumed from the single example recorded here. This case illustrated the problems that may be encountered, since the clinical picture was not inconsistent with that of a vascular process. A head injury had occurred, but its importance had been minimized, and satisfactory information concerning its exact relationship to the onset of the mental illness could not be obtained.

From the foregoing observations, it is evident that one must guard against a variety of pitfalls in the clinical diagnosis of senile and arteriosclerotic psychoses. The two conditions display many resemblances, but they also show enough differences to render their separation feasible. Probably the chief requirement for their differentiation from other disorders is a constant alertness to the fact that illnesses which are neither arteriosclerotic nor senile in nature commonly occur in elderly persons. While not claiming that all mistakes can be avoided, it is believed that a careful analysis of the whole picture, without recourse to anything beyond ordinary clinical procedures, should lead to a correct diagnosis in the great majority of instances.

Summary

The clinical diagnosis of senile and arteriosclerotic psychoses is discussed on the basis of observations in 60 anatomically verified cases.

Senile psychoses tend to occur at a later age and are apt to last longer than arteriosclerotic psychoses. In the former the course was gradually progressive; in the latter a sudden onset was common and the illness was sometimes brief and stormy.

As a rule, intellectual impairment was more pronounced in senile conditions. Acute states of confusion were typical of arteriosclerotic psychoses. Unless their manner of

development is known, they cannot always be distinguished from the chronic confused states associated with senile psychoses. Depressive and hypochondriacal-like symptoms were often noted in arteriosclerotic disease; they were seldom a prominent feature of senile disorders. Marked fluctuations in the severity of the intellectual disturbances were common in the former but did not occur in the latter.

Paranoid forms of senile psychosis resembled arteriosclerotic psychoses in that the intellectual functions were usually relatively well preserved, but outspoken and chronic paranoid syndromes were not encountered in arteriosclerotic disease.

Headache, dizziness and apoplectiform phenomena were observed in a considerable number of arteriosclerotic patients, though as a rule permanent neurologic changes did not occur early in the illness. Other characteristic features of this group were syncopal attacks, convulsive seizures, explosive emotional outbursts and clinical indications of cardiac disturbances.

Peripheral (radial) sclerosis was noted with equal frequency in the two psychoses. Hypertension was almost as common in senile patients as in arteriosclerotic patients.

Anatomically pure forms of senile or arteriosclerotic disease occurred less often than mixtures of the two processes, but clinical pictures of a mixed nature were not nearly as frequent as might be anticipated from the anatomic findings.

The mistakes in diagnosis uncovered by anatomic examination are discussed. A diagnosis of senile or arteriosclerotic disease, especially the latter, is made in too many rather than in too few cases. Toxic or symptomatic psychoses are a common source of error.

BIBLIOGRAPHY

1. Rothschild, D.: Pathologic changes in senile psychoses and their psychobiologic significance. Am. J. Psychiat., **93**: 757, 1937.

2. Dayton, Neil A.: New facts on mental disorders, Springfield, Ill., Charles C. Thomas, 1940.

3. Alzheimer, A.: Die Seelenstörungen auf arteriosklerotischer Grundlage. Allg. Ztschr. f. Psychiat., **59**: 695, 1902; Barrett, A. M.: Presenile, arteriosclerotic and senile disorders of the brain and cord, in White, W. A., and Jelliffe, S. E., The modern treatment of nervous and mental diseases, Philadelphia, Lea and Febiger, 1913, vol. 1.

4. Malamud, W., Fuchs, D. M., and Malamud. N.: Barrier between the blood and the cerebrospinal fluid. Arch. Neurol. & Psychiat., **20**: 780, Oct. 1928; Rothschild, D., and Hamberg, C. N.: The blood-cerebrospinal fluid barrier in mental disorders. Am. J. Psychiat., **91**: 1033, 1935.

5. Rothschild, D.: Alzheimer's disease: A clinicopathologic study of five cases. Am. J. Psychiat., **91**: 485, 1934; Rothschild, D., and Kasanin, J.: A clinicopathologic study of Alzheimer's disease: Relationship to senile conditions. Arch. Neurol. and Psychiat., **36**: 293, Aug. 1936.

6. Elsberg, Charles A., and Globus, Joseph H.: Tumor of the brain with acute onset and rapidly progressive course: "Acute brain tumor." Arch. Neurol. and Psychiat., **21**: 1044, May 1929; Wechsler, Israel S.: A textbook of clinical neurology, Philadelphia, W. B. Saunders Company, 1935.

NARCOLEPSY

A Review and Presentation of Seven Cases

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In 1880 Caffe brought before the medical public of Paris a most interesting case, the essential feature of which was repeated and apparently irresistible attacks of sleeping. This condition was called "narcolepsie" by Gelineau(1) in a published description and the term has since been retained. Cases of this type were described before the time of Gelineau, but they were for the most part incomplete Willis(2) described a case of "morbid sleeping" as early as 1677 and argued that this was a disease and not merely an evil habit. He prescribed frequent doses of hot coffee and until recently nothing better could be offered. A case of "pernicious sleeping" was recorded by Fournier(3) in 1813 and twenty-three years later Richard Bright(4) reported a case complete with autopsy report of a man dying of apoplexy who for thirty-four years had been plagued by spells of extreme drowsiness coupled with attacks of helplessness. The latter symptom was first recognized as an integral part of the disease by Lowenfeld(5) in 1902. In the German literature a case was reported by Thuman and Friche(3) as early as 1841, and the problem of pathological sleep was brought up and ably discussed by Westphal (6) in 1877 although he did not discuss narcolepsy as an entity. Aside from its interest, the historical material merely serves to show that the problem of narcolepsy is by no means a new one.

As with all illnesses in which the symptoms embrace an exaggeration of normal responses, the medical issues have clashed with moral ones. Consider the classical illustration of narcolepsy described by Dickens in *Pickwick Papers* published in 1837—Joey the fat boy who fell asleep with a piece of pie in his mouth and resumed chewing on it when he awakened. Was Dickens describing, as he so often did, a character from real life, possibly an endocrinopath, or was the plump little fellow entirely fictitious and made fat only because it fit in with the then, as now, popular conception of slothfulness? Perhaps the comparative rarity of such cases in the past was due in part to shame on the part of the patient and fear of ridicule as well as disinterest on the part of the medical profession. It will take more than this to explain the great increase in the number of cases of the disease. No doubt the increase in the medical literature is in part responsible, especially when it is considered that the term narcolepsy has become broadened in scope and includes practically any disturbance in the normal sleep-wakefulness rhythm. Wilson(7) after seeing his first case in 1906 looked for more of them unsuccessfully until 1927, when he encountered four in one month. By 1931 the reported cases numbered 481(3) and well over 200 more have been added, the majority in the German literature. In 1919 only one case was seen at the Mayo Clinic—.0017 per cent of the cases for the total year, while in 1931 the number had risen to 31 or .02 per cent(8). In 1926 cases of this kind were for the first time reported and the literature summarized by Adie(9).

Besides irresistible attacks of sleeping which occur at any time and place there are the so-called cataplectic attacks which consist of weakness and loss of muscular tone often coming on with dramatic suddenness. Apparently these attacks occur when stronger than ordinary emotion is aroused, laughter, queerly enough, being especially potent in this respect. In the majority of cases narcoleptic and cataplectic attacks originate at the same time(10, 11). There are many other symptoms of less importance, infrequent in their occurrence en masse but present to some extent in all cases(11, 9, 10, 12, 13). Those most frequently listed are: easy fatigability, disturbed nocturnal sleep as evidenced by motor restlessness, nightmares, sleep walking and talking, and evidences of

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autonomic instability such as sinus arrhythmia, increased perspiration, sexual difficulties and gastro-intestinal disturbances. This group of symptoms although pathognomonic of no disease is of interest inasmuch as it shows that something other than a simple involvement of a hypothetical sleep center is involved. In the recorded cases the age of the patient at the time of onset of the disease varies from four to fifty-three with a predominance of males in the order of four to one. Young people under twenty are most frequently affected and the course of the disease is prolonged but with no demonstrable effect on longevity(10, 14). The majority show periods of remission and intermission and some have been reported "cured," a matter which will be discussed later.

All the aforementioned characteristics are susceptible to a great deal of modification. The literature itself is inconsistent. For instance, as regards the problem of disturbance in nocturnal sleep, Wilson(7) reports that the majority of cases show none, whereas practically everyone else claims that this symptom is found consistently. The attacks of sleep are not always irresistible. Some are able to shake them off at the cost of a great deal of effort, a delayed reckoning being the usual result. Others are unable to do this and there are records of patients falling asleep while talking, eating and even walking. One patient, a doctor, fell asleep during a gynecological examination and another went to sleep while having relations with his wife. Thus we can easily see that this is an embarrassing as well as an annoying illness and it will be well to remember these two cases not only because they are semi-humorous but are of interest when we come to discuss the rôle cerebral inhibition may play in this disease. For the most part the attacks occur in situations conducive to natural sleep which they closely resemble, *i.e.*, after eating, in the movies, riding on trains or driving an automobile. The sleep appears normal. The face is slightly flushed, the breathing slow and shallow and the body completely relaxed. The onset of the attacks is frequently marked by spells of protracted yawning and marked loss of affective tone and occasionally by generalized paresthesias. Various motor phenomena have been reported in association with these attacks such as the twitching of an eyelid or movement of the hands or trunk. Westphal(6) observed a tremor and drawing of the face to one side in his case and Noah(14) a peculiar head movement. Goldflam has observed tongue spasm and Fischer (14) speaks of a generalized spasm. Indeed, there are hosts of other observations including deviation of the tongue to either side, ophthalmoplegia, tics, vertigo, migraine, nystagmus and enuresis(14). These, although also pathognomonic of nothing, are of interest when we come to consider the pathogenesis of this disease. Some patients have claimed that although they appeared asleep they were aware of what went on although unable to move or to speak—and here we reach a borderland where the phenomena of narcolepsy seem to blend with those of cataplexy.[2] Whereas the majority of cases show both narcoleptic and cataplectic attacks, many show but one of these or one at first and later the other. Also, one may substitute for the other, that is, attacks of emotion may precipitate sleeping spells and when sleeping spells are successfully fought off, cataplectic attacks may occur. In frequency the attacks vary from two or three per day to two hundred in one day. (Gelineau's case (1).)

None of the cases I have seen has been associated with head trauma although this matter was not ignored in reviewing or taking the history of each case. For descriptive purposes the seven cases to be presented have been classified as follows:

A. Cases with No Demonstrable Organic or Psychopathic Background

Case 1.—B.D. No. 35333I.—A white male, aged 23, single, American ancestry, admitted complaining of sleeping spells. He was indefinite regarding the onset which dated back probably 4 or 5 years at which time he noticed an irresistible desire to sleep while driving his truck. He would pull over to the side of the road and sleep for fifteen minutes, then

[2] The latter term must not be confused with catalepsy. An attack of cataplexy results from a highly emotional experience and leads to complete loss of muscular tone. The patient becomes weak, even helpless and unable to move from the floor on which he has slumped. Catalepsy refers to a state found in hypnotic procedures and is characterized by muscular rigidity and a great increase in suggestibility.

awaken refreshed and drive off. Because of this he had to give up his work. In the last year or two he has had two or more of these spells daily, particularly after eating or on sitting down after working. During the last few years he has also had attacks of a different nature. These seem to come mainly after laughing or some other emotional display and he would collapse and fall to the floor unable to move or control his muscles. At times these spells affect him so that he cannot move his hands or feet and cannot talk although he may be fully conscious. The sleeping spells last approximately 15 minutes and the spells wherein he loses control of his muscles last but a few minutes. Aside from these spells he has been quite well; although he reports that his memory is poorer than before the onset of this disease and he has noticed an increase in weight in the past five years which he feels is more than the normal expectation. There is no past history of influenza or any disease remotely resembling encephalitis, and no history of head trauma has been elicited other than a fall when a child which did not produce unconsciousness but necessitated four stitches in the back of his head. His father died at the age of 56 after a series of convulsions over a period of years.

He was a healthy, husky appearing young man whose physical examination was entirely negative. There was no evidence of neurological or endocrine abnormalities.

Urinalysis was negative. Blood count, sedimentation rate, Hinton, Wassermann and Kahn and fasting blood sugar showed nothing of pathological significance. The B.M.R. was minus 10 per cent. The X-ray of the hands was reported as follows: "Square formation of the metacarpals suggestive of acromegaly, but the characteristic changes are lacking at the distal phalanges."

Temperature, pulse and respirations were normal during his stay at the hospital. Several attacks were observed. He has been followed in the nerve clinic of the Boston Dispensary. Ephedrine stopped the weak spells but had little effect on his sleeping spells. Benzedrine in doses up to 15 mg. T.I.D. would help him to the extent that he felt "almost normal," however, he claimed to establish a tolerance for the drug quickly and that larger doses made him feel "jittery." He thinks that a chiropractic neck adjustment helped him more than any other treatment although he had this over a year ago and has not returned for another treatment. Of late he has admitted that benzedrine (10 mg. B.I.D.) helped him more than any other thing, but he has been prejudiced against using it as he does not wish to become "a slave to this habit." Furthermore, he has confused his illness with epilepsy and has felt as if he were somewhat of an outcast.

Case 2.—Pratt Diagnostic Hospital, No. 4010.—A 28-year-old, single, white female, admitted with the history of spells of weakness and sleepiness of three years' duration. These had come on gradually since the age of 25, the attacks of sleepiness occurring particularly after eating and while at the movies. She was able to remain awake with great effort but had to arise and walk about actively. When any strong emotion was experienced, particularly laughter, her lower jaw would sag and her knees buckle under her and she was compelled to sit down to prevent falling. Nocturnal sleep was restless, although not remarkably so. She complained of her hands and feet being cold all the time, and of being subject to spells of dryness of the throat. She had noticed occasional and transient attacks of diplopia during the past year. Her past history was irrelevant.

On examination she showed a slight nystagmus to the left and absent or very diminished abdominal reflexes. There was a moderate amount of hirsutism over the face and chest and a masculine pubic hair distribution. Neurological and endocrinological examinations were otherwise entirely negative. The B.M.R. was minus 3 per cent and the spinal fluid showed a normal pressure and dynamics with a protein of 55 mg. and a slight mid-zone gold curve. Blood and urine examinations were negative.

It is interesting that both patients complained of transient attacks of diplopia. This is fairly frequent(15). The second case showed also nystagmus and absent abdominal reflexes. This certainly is suggestive of multiple sclerosis, and it might be noted that Jacobsohn(3) has reported in detail a case of narcolepsy in connection with a well developed picture of multiple sclerosis. However, it is only fair to state that the complaint of seeing double is commonly met with in psychoneurotics, and no attack occurred while the patient was under observation in hospital. For that matter no narcoleptic seizures were observed. Of interest to the endocrinologist is the suggestion of acromegly and the gain in weight in the first patient and the low B.M.R. and hirsute tendencies of the second patient. It can readily be seen, however, that while there is much that is suggestive there is little that is definite in the total picture.

B. Cases Following Definite Evidence of Encephalitis

Case 3.—B.D. No. 398787.—A 31-year-old single, Italian male with a complaint of sleeping spells and stiffness of right side of two years' duration. Five years ago he had "a severe cold" accompanied by a headache and a sleeping spell lasting twenty-four hours wherein he could not be awakened. During the past year he falls asleep whenever he sits down and relaxes, especially after meals. Laughter makes him helpless and weak. Physical examination showed typical Parkinsonian facies and gait and muscular rigidity. Rabellon tablets B.I.D. relieved the post-encephalitic symptoms markedly and sleeping spells were entirely abolished by 5 mg. Benzedrine B.I.D. in conjunction with rabellon.

CASE 4.—Pratt Diagnostic Hospital No. 2371.—This patient, a 60-year-old white male complained on admission of irresistible attacks of sleepiness and attacks of weakness whenever he laughed. In 1925 he had an attack of "influenza" and remained in bed for a week to ten days, recovering only to have a relapse three weeks later. There was no history of a disturbed sleep cycle at this time, oculogyric crises, headache, etc. In 1934 he was in an auto accident and was badly shaken up. There was no head injury or loss of consciousness. Five months later he noticed that when he laughed or became excited his knees gave way and he had to sit down or would fall down. About this time he began to notice also that when he sat down after his meals he would quickly fall asleep. He did not think this unusual until he began to fall asleep four to six times a day. When an attack came on he would be forced to stop whatever he was doing and sit down. The sleep was normal in appearance according to his friends and lasted approximately five minutes. Physical examination showed a tall, very spare, elderly man with no abnormality other than a large prostate. Neurological examination with a special reference to signs and symptoms of Parkinsonism was entirely negative.

The reader is free to include this case in either group A or group B. It is included in the latter in order to bring up the problem of whether or not the so-called idiopathic cases of narcolepsy are the only sequelæ of mild, unrecognized cases of epidemic encephalitis. There is, however, little reason for adopting this point of view. Many other peculiar diseases of the nervous system as well as narcolepsy have been closely linked with epidemic encephalitis, due perhaps to the following reasons: 1. Many patients with signs of post-encephalitic Parkinsonism give no history of an attack of encephalitis; 2. Many attacks of encephalitis have been diagnosed as influenza; 3. Practically every patient has had "influenza."

C. CASES WITH AN ENDOCRINE BACKGROUND

CASE 5 (private).—A 31-year-old, white housewife came in with the complaint of a choking sensation coupled with easy fatigability and attacks of sleeping of two years' duration. During this time she suffered from attacks of mild nausea, frontal headaches, photophobia and "hot dry feeling" around the eyes. The choking sensation was definitely worse during her periods. When she became excited she felt "horribly weak," her legs "caved in" and her muscles were like "jelly." She had chorea as a child and the "flu" in 1918. The sleeping attacks came on whenever she sat down and could not be denied except at the cost of great effort, which she declared she had not the strength to make very often. These attacks would last 5 to 10 minutes and she would awake feeling quite refreshed. In spite of having 2 to 3 attacks daily she found it necessary to get eight to nine hours sleep nightly. This nocturnal sleep was described as light and filled with nightmares and attacks of sleep-walking and talking. She has often awakened with typical feelings of anxiety. Her heart would pound and her mouth become dry and she would be unable to move. An attack of diplopia lasting approximately five minutes and accompanied by a terrific headache appeared one year ago. She had been subject to occasional paresthesias of her arms and legs and has for the past year felt increasingly depressed and emotional. Her weight has steadily decreased from 135 to 128 pounds. When examined she showed a moderately large, firm, non-nodular thyroid, a moderately severe hypochromic, microcytic type of anemia and a WBC differential that showed a relative (60 per cent) lymphocytosis. The basal metabolic rate was minus 3 per cent. There was no evidence of any neurological abnormality. The spinal fluid was negative. On iodine medication her symptoms subsided and in six months had disappeared with the exception of attacks of sleep. These were relieved by small doses of benzedrine which however had to be discontinued due to the nausea produced. Accessory vitamins, iron and correction of her dietary habits were utilized as well as small doses of phenobarbital. The latter has paradoxically decreased the number and intensity of her attacks of sleeping, possibly by improving the quality of her nocturnal sleep. She has been free from symptoms for the past 5 months.

Many interesting observations have been made in typical cases of narcolepsy that would imply an endocrine background for this disease. A small sella is a common finding, Redlich(15, 16) alone reporting four cases. Some cases are associated with pituitary tumors. Many show poor secondary sexual characteristics and the B.M.R. is practically always decreased. Polyuria and polydipsia have been reported in three cases in the German literature. Up to 1931 some of the best treatment results were obtained from the use of thyroid. Reinweir(17) reported a typical case of narcolepsy associated with acromegly and a case of marked diurnal somnolence in a diabetic and acromegalic patient. Seale Harris(18) has reported a case due to hyperinsulism cured by a partial resection of the pancreas, but this may have been a case of mild attacks of diabetic coma. In a series of 49 cases reviewed by Cave the females averaged 49 pounds overweight and the males 24 pounds. Breyerman(19) reports four cases with hypogenital adiposity, low B.M.R., low blood pressure and abnor-

mally small sellæ. All were "relieved" by injections of anterior pituitary extract.

D. Cases with Psychopathological Background

Case 6 (private).—A 35-year-old white housewife came to the office with the complaint of three years' duration, of weakness, coupled with frequent overpowering attacks of sleepiness. She had been very much embarrassed by these attacks which occurred at women's club meetings, where she played an active rôle, at the theatre during pictures she wished to see and at various social events both at home and while visiting friends. Many people remarked about her trouble, considering these attacks "queer" as she appeared alert and normal one moment and the next sound asleep. The attacks did not differ any from normal sleep but refreshed her very much. The feeling of weakness was slight but definite and was aroused for the most part by arguments with her husband. She had been taking 30-40 mg. of benzedrine daily but fell asleep occasionally in spite of this. Her physical and neurological examinations were completely negative. Her night sleep was sound but of only five or six hours' duration. She maintained that she did not need any more and that the addition of a few hours at night did not help at all. She showed a relative lymphocytosis of 53 per cent which was of interest inasmuch as it has been so frequently reported in the literature in cases of this type. This case was included after much hesitation as the patient was leading an extremely unhappy marital life and it is possible that she was depriving herself of more nocturnal sleep than she was willing to admit.

E. Cataplexy without Narcolepsy

Case 7 (private).—This patient was a 37-year-old housewife, who complained of loss of weight of 6 months' duration. She had had a previous episode of like nature two years ago due to domestic difficulties. The present episode had been developing for one year as a feeling of nervousness and insecurity and was based on her marital difficulties. Anxiety attacks had been occurring with great frequency at night. Her nocturnal sleep had been filled with bad dreams. She began to smoke 20 to 30 cigarettes a day and felt in need of a drink every now and then. For the past year she had had occasional upsets in connection with her husband and when she became angry after thinking over his remarks, she had an attack of weakness, fell to the floor, powerless, and acted as though she had fainted "only my mind is perfectly clear." Neurological and physical examinations including an X-ray of the chest were negative. Her B.M.R. was plus 2 per cent. Fortunately it was possible to help this patient considerably as her troubles were entirely situational and disappeared when the situation was changed. The mechanism behind these attacks is clearly illustrated by the description of the last one which occurred 8 months ago. At this time she was going down in an elevator in a large department store and glancing over the shoulder of a woman who was holding a newspaper, read an account about a man who had been stabbed by his wife and killed. The thought that she might do this entered her mind, and she felt weak and collapsed. The psychic inhibitory mechanism at work is apparent and was found to be due not only to the repressed hostility and death wish in connection with her husband, most of which was fairly near consciousness, but due also to identification of her husband with her father, to whom she had been excessively attached. This case is of interest only because it contains an instance of episodes which are identical with the cataplectic attacks found associated with narcolepsy.

The majority of neurologists feel that the diagnosis of narcolepsy should be reserved for those cases that show attacks of both narcolepsy and cataplexy. Some have tried to link the trouble with epilepsy, as though it were an equivalent or variant of this condition. The electroencephalographic findings in these cases show little evidence of pathological cerebral dysrhythmia. As causative agents of the disorder many possibilities have been postulated, including epidemic and other types of encephalitis, head trauma, syphilis, brain tumor (usually in the 3rd ventricle, one case reported in the temporal lobe), diabetes, pituitary disorder, cerebral arteriosclerosis, idiopathic and traumatic epilepsy, hyperinsulinism, influenza, birth injury, hysteria and psychoneuroses, multiple sclerosis and polycythemia vera.

Such a wide variety of possible causes suggests that we are dealing with a syndrome rather than a disease, and the definite pattern in which the symptoms are grouped, as well as the fact that they are simply an exaggeration of normal patterns, suggests that we are dealing with a phenomenon produced by diminution of cortical control either by physical damage to the cortical tracts or by their inhibition. The narcoleptic attacks would thus be in the nature of a release phenomenon. In accord with this hypothesis is the fact that in children and lower animals sleep is polyphasic, whereas in the higher animals and man it is monophasic. It is possible that in narcolepsy some factor depresses cortical control and the primitive polyphasic sleep rhythm is released.

A great number of remedies for narcolepsy

have been employed in the past, with varying degrees of success. With the introduction of amphetamine sulfate, or benzedrine, however, a nearly specific remedy became available. The majority of these cases will respond in a gratifying manner to the judicious use of this drug, which is not habit-forming and has minimal toxic effects.

Conclusions

1. Narcolepsy is a borderline syndrome common to cases of both functional and organic brain disease.

2. The pathogenesis is the same in both cases and consists of the release of a primitive type of sleep mechanism.

3. Narcoleptic sleep is indistinguishable in appearance and electroencephalographically from normal sleep.

BIBLIOGRAPHY

1. Gelineau: De la narcolepsie. Gaz. d. hop., **53**: 626, July 8, 1880.
2. Lennox: Thomas Willis on Narcolepsy. Arch. Neurol. and Psych., **41**: 348, 1939.
3. Nothin and Jelliffe: The narcolepsies. Arch. Neurol. and Psych., **31**: 615, 1934.
4. Cave, H. A.: Narcolepsy. Arch. Neurol. and Psych., **38**: 136.
5. Lowenfeld, L.: Über Narkolepsie. Münchn. med. Wchnschr., **40**: 1041, 1902.
6. Westphal, C.: Eigentümliche mit Einschlafen verbundene Anfälle. Arch. für Psychiat., **7**: 631, 1877.
7. Wilson, S. A. K.: The narcolepsies. Brain, **91**: 63, 1926.
8. Daniels: Narcolepsy. Med., **13**: 1, Feb. 1934.
9. Adie: Idiopathic narcolepsy. Brain, **49**: 257.
10. Cave, H. A.: Narcolepsy. Arch. Neurol. and Psych., **26**: 50, 1931.
11. Thiele and Bernhardt: Abhandlungen aus der Neurologie. Psychologie und ihren Grenzgebieten, Berlin, S. Karger, **69**: 1, 1933.
12. Jelliffe, S. E.: The problem of narcolepsy. Med. J. and Rec., **129**: 313, 1929.
13. Rosenthal, C.: Über Narcolepsie. Arch. Psych., **96**: 522, April 1932.
14. Redlich, E.: Epilegomena zur Narcolepsiefrage. Ztschr. f. d. ges. Neurol. u. Psychiatrie, **136**: 128, 1931.
15. Doyle and Daniels: Results of the treatment of narcolepsy with ephedrine. J. A. M. A., **98**: 542.
16. Redlich, E.: 1917 Yearbook of psychiatry, Yearbook Publishers, Chicago, **37**: 68.
17. Reinwein, H.: Beitrag zum Symptomenkomplex der Narkolepsie. Deutsche Med. Wchnschr., **60**: 1382, Sept. 14, 1934.
18. Seale, H.: Epilepsy and narcolepsy associated with hyperinsulinism. J. A. M. A., **100**: 321.
19. Breyerman: Narcolepsy and the pituitary body. Arch. Psychiat., **19**: 463, 1930.
20. Dikshit: J. Physiol., **83**: 42, p. 1935.
21. Tanzen, R.: Hirnbioelektrische Untersuchungen über den physiologischen Schlaf und den Schlafanfall bei Kranken mit genuiner Narkolepsie. Deutsche Ztschr. für Nervenheilkunde, 149 Bd., 1 and 2 Heft.
22. Personal communication.
23. Osnato, M., and Vincent, G.: Narcolepsy. Arch. Neurol. and Psych., **18**: 181.
24. Singer, Kurt and Echter: Pseudonarcolepsy. Ztschr. f. d. ges. Neurol. u. Psychiat., **36**: 278, 1917.
25. Hall, G. W., and Leroy, G. B.: Post-traumatic narcolepsy. J. A. M. A., **106**: 431.
26. Michier, V. E.: The anatomic basis of sleep. J. Neuropath. Psichiat., **1**: 75, 1931.
27. Helmuth, Ulrich: Narcolepsy and its treatment with benzedrine. N. E. J. M., **217**: 696.
28. Wohlfahert: Some clinical researches in narcolepsy. Acta Psychiat. et Neurol., **6**: 277, 1931.
29. Levin, M.: Role of the cerebral cortex in narcolepsy. J. Neurol. and Psychopath., **15**: 236, 1935.
30. L'Hermitte: Narcolepsie, cataplexie and pyknolepsie. J. Paris Med., **8**: 509, 1929.
31. Fulton: Physiology of the nervous system. Oxford Medical Publications, p. 225, 1939.
32. Mueller: Fatigue, sleep and restoration. J. A. M. A., **104**: 2380.
33. Fessler, L.: Wien. med. Wochenschr., Vienna, Jan. 29, 1938.
34. Prinzmetal and Bloomberg: Use of benzedrine for the treatment of narcolepsy. J. A. M. A., **105**: 2051.
35. Alles: J. of Pharm. and Exper. Therapy, **47**: 339.
36. Janota, O.: Über Narkolepsie. Med. Klin., **27**: 278.
37. Benedek: Case report. Riforma Medica, Naples, **47**: 441.
38. Janet: The major symptoms of hysteria. MacMillan, 1929.
39. Kraepelin: Clinical psychiatry. Wm. Wood and Company, 1904, p. 252.
40. Jones, M. S.: A case of recurrent attacks of prolonged sleep. J. Neurol. and Psychopath., **16**: 130, 1935.

ENCEPHALOPATHIA ALCOHOLICA

An Evaluation of Vitamin Therapy [1]

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The cerebral complications of chronic alcoholism are now considered more likely to be due to a metabolic, more specifically an avitaminotic disturbance than to the direct toxic action of alcohol on the nervous system. This view is supported by the following factors:

1. The diet of alcoholics is deficient in vitamins. In general, they substitute vitamin-free alcohol for vitamin-containing foods.

2. Alcoholics have impaired gastro-intestinal absorption because of associated gastritis and hepatitis. As a result they do not absorb completely, or utilize properly, even the small amounts of food which they do eat.

3. The increase in total metabolism which occurs in alcoholic states, and particularly in delirium tremens, necessitates a larger supply of vitamins and other nutritive essentials. As a result relative or absolute deficiencies may appear which might not otherwise be present.

It is the purpose of this paper to review the vitamin factors in encephalopathia alcoholica as they relate to the most commonly seen syndromes.

Symptoms Resulting from a Deficiency of Nicotinic Acid

Jolliffe and Stein(1) have recently presented evidence to indicate that the peripheral manifestations of alcoholic pellagra are those of endemic pellagra as modified by the direct and indirect effects of alcohol. This, we believe, is equally true for the mental picture in "alcoholic" pellagra.

Pellagra was first described by Gaspar Casal, a Spanish physician, in 1735, but his observations were not published until 1762, three years after his death. The first published report appeared in the French literature in 1755, but the author, formerly physician to the French Ambassador at the Spanish court, freely acknowledges his debt to Casal(2). States of mania, depression and confusion are described as accompanying the "mal de la rosa," and their severity and chronicity are emphasized. "Without doubt these are produced by metastasis to the brain of the acrid and malign humours which produced this malady."

Almost immediately following the discovery of the value of nicotinic acid in the treatment of the peripheral manifestations of human pellagra, a series of articles(3,4,5,6) appeared reporting its usefulness in the treatment of the cerebral disorders seen in pellagrins. The more obvious mental manifestations of pellagra are the various organic psychoses which complete the diagnostic triad of diarrhea, dermatitis and dementia. The most common is perhaps that in which loss of memory, disorientation, confusion and confabulation are present. There are also types in which excitement, depression, mania and delirium may occur. In our experience, a paranoid condition is common in pellagrins, as in many other organic psychiatric pictures. Spies and his associates(3) report that all their treated psychotic patients recovered, but the psychosis in most of their cases was only of one to two weeks' duration. We(7) have confirmed these findings in our experience at Bellevue Hospital. We would emphasize, however, that careful psychiatric examination often reveals residual organic memory defects in these patients. In the psychoses of longer duration associated with pellagra the response to nicotinic acid is certainly not spectacular, and the specific therapy may be ineffectual. This does not mean that lack of nicotinic acid was not concerned in the genesis of the mental picture. It does, however, accentuate the fact that these metabolic disturbances may finally proceed to structural and possibly irreversible changes. To be efficacious, therefore, therapy

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should be instituted before this process takes place. It must also be emphasized that many of the acute excitements and deliria associated with pellagra clear without nicotinic acid therapy. Finally, it is wise never to forget that pellagrins are usually lacking in other factors contained in the well balanced diet and probably necessary for normal brain metabolism. Adequate amounts of other vitamins should therefore be given to pellagrins with encephalopathic manifestations in order to insure maximal therapeutic results.

Cleckley, Sydenstricker and Geeslin(8) have reported on 19 stuporous patients who showed a remarkable response to nicotinic acid therapy. They concluded that hebetude grading into profound stupor may be the only sign of severe acute pellagra, and that therapeutic trial of nicotinic acid is justified as the only method at present available for the diagnosis of such cases.

Jolliffe, Bowman, Rosenblum and Fein(9) have reported 150 cases of an "encephalopathic syndrome," formerly almost invariably fatal, which they believe is caused by nicotinic acid deficiency. Nearly all of their patients were chronic alcoholics. This syndrome may be the only manifestation of a deficiency disease or it may occur with pellagra, polyneuritis due to vitamin B_1 deficiency, or the ophthalmoplegia associated with Wernicke's disease. The clinical picture is characterized by clouding of consciousness, cog-wheel rigidities of the extremities, and uncontrollable sucking and grasping reflexes. It is necessary to differentiate, however, the encephalopathic manifestations of groping, grasping and sucking which may occur during the course of delirium tremens, infectious diseases with delirium, expanding intracranial lesions, advanced cerebral arteriosclerosis and other diseases. Jolliffe also notes that some of the cases previously described by Spies(3), Matthews(4), Sydenstricker(5) and Cleckley(8) and their coworkers may have belonged to this group.

Since not all the patients with the "encephalopathic syndrome" presented the usual skin and mouth lesions associated with pellagra, it was assumed that this syndrome represents an acute complete nicotinic acid deficiency which sets in so rapidly that the structural changes in the skin and mouth, characteristic of pellagra, do not have time to develop. Patients manifesting this syndrome treated by hydration alone or hydration plus thiamin hydrochloride almost invariably died (95 per cent). Patients treated by hydration plus concentrates rich in the vitamin B-complex showed a substantial drop in mortality (50 per cent). But since these patients have been treated by hydration plus nicotinic acid the mortality has fallen to 15 per cent.

Wernicke's Syndrome

In 1881 Karl Wernicke(10), on the basis of 3 cases studied carefully during life and at autopsy, delineated a clinical syndrome characterized by clouding of consciousness, varying ophthalmoplegias and ataxia. The author did not indict alcohol as the causative agent, but suggested that various toxins, including alcohol, might produce the clinicopathologic picture. Nevertheless most subsequent cases were reported in inebriates, and alcohol gradually came to be accepted as the etiologic basis of this condition. As a matter of fact, Wernicke's original case did not occur in an alcoholic.

The patient was a 20-year-old seamstress who was admitted to the Charité following a suicidal attempt with sulphuric acid. She left the hospital after several days, but soon intractable vomiting set in, probably as a result of pyloric stenosis. The vomiting continued, and after one month she became stuporous and developed ophthalmoplegia and ataxia. In addition, there was moderate swelling of the optic discs with associated retinal hemorrhages. Her condition gradually became worse, and she died one week after the onset of this complication. Wernicke's other 2 cases, however, occurred in alcoholics who were admitted in delirium. The essential pathology was described by Wernicke and has been further elaborated by others.

In general, the cerebral lesions(10,11,12) are confined to the periventricular gray matter, and are characterized by small foci of degeneration and varicose deformities of the blood vessels. There is subacute necrosis of the adjoining parenchyma and small petechial hemorrhages are frequently but not always found throughout the lesions. The

areas most constantly involved are the paramedian and paraventricular nuclei of the thalamus and hypothalamus, the mammillary bodies, the periaqueductal regions of the midbrain (third and fourth nerve nuclei), the abducens nuclei, the nuclei triangularis and Bechterew of the vestibular nerve and the dorsal vagus nuclei. We accentuate these pathological findings because this is the only cerebral syndrome complicating chronic alcoholism in which the clinical picture may be consistently fairly well correlated with the pathological phenomena. In addition, it must be emphasized that these findings are not those usually associated with an inflammatory lesion.

Besides the innumerable cases reported in inebriates, a review of the literature(13) reveals some 40 cases described in non-alcoholic individuals. These latter are usually associated with gastro-intestinal disorders or carcinomata accompanied by cachexia and vomiting. Many of the authors suggested a metabolic etiology, but opinion regarding the nutritional origin of the Wernicke Syndrome was not crystallized until 1938, when Alexander and his co-workers(11) were able to produce this syndrome in pigeons fed a thiamin-deficient diet. They could not reproduce this disease in pigeons given thiamin even when they were deprived of all other vitamins or of any one other vitamin for a period of over six months. In 1940 Alexander(12) amplified his original report and showed conclusively that the lesions of Wernicke's polio-encephalopathy occurring in man, and the disease which he had produced experimentally in vitamin B_1 deficient pigeons, were identical in their topographic distribution and in their morphologic and histologic characteristics.

We(13) have recently reported our clinical findings in 27 cases. Three of these occurred in non-alcoholics (two depressed patients who refused to eat, and one with pulmonary tuberculosis and associated vomiting); the other 24 occurred in chronic alcoholics.

Our results may be summarized as follows:

1. The syndrome as originally described by Wernicke is probably a combination of several nutritional deficiencies affecting the nervous system and need not necessarily be complete in any case.

2. (a) The ophthalmoplegia responds to thiamin therapy. (b) The clouding of consciousness may be related to any agent which interferes with brain metabolism; among the known offenders are lack of carbohydrate, lack of oxygen, lack of thiamin, nicotinic acid and riboflavin and probably lack of many other substances now under investigation. (c) The ataxia is difficult to evaluate and its response to therapy has not as yet been worked out.

3. Other deficiency syndromes (pellagra, nicotinic acid deficiency encephalopathy, riboflavin deficiency, scurvy) may and do superimpose themselves on the more usual Wernicke picture, and these require specific treatment.

4. The ophthalmoplegia is invariably preceded or accompanied by peripheral neuropathy. Since the latter results from thiamin deficiency, this finding tends to confirm Alexander's thesis that they have a common etiology and that the polioencephalopathic changes represent a more complete deficiency of thiamin.

5. Delirium, with its marked increase in psychomotor activity, and hence in total metabolism, usually precedes the development of this syndrome. The timely administration of thiamin at this stage will prevent the development of ophthalmoplegia.

6. All patients who received adequate vitamin therapy recovered, unless a complicating syndrome (pneumonia, toxic hepatitis, etc.) was present which in itself was sufficient to cause death. In the recovered patients, the development of a Korsakoff syndrome is the rule.

We wish, therefore, to re-emphasize the fact that Wernicke's syndrome, as we see it clinically, does not represent a simple thiamin deficiency. In our experience it is invariably associated with a deficiency of thiamin, but there is also lack of other nutritive essentials. In the treatment of these patients we therefore advocate a high-calory, vitamin-rich diet, with other vitamin concentrates in addition to thiamin.

The Korsakoff Syndrome

In 1887 the Russian psychiatrist Korsakoff(14) described the psychosis now bearing

his name. It consists of a defective memory for recent events, with a tendency to confabulate, and with disorientation for time, place and person. Peripheral neuropathy is usually a part of this syndrome, although sometimes the peripheral nerve involvement is minimal or even not detectable clinically. While most commonly associated with chronic alcoholism, it is frequently seen in conjunction with many other conditions (head injury, diabetes, arteriosclerosis, subarachnoid bleeding, toxic and drug psychoses, etc.). The frequent concomitance of peripheral neuropathy has caused lack of thiamin to be suspected as the etiologic agent, and several confirmatory reports have been published. Strauss(15) suggested that ". . . . the Korsakoff syndrome and other similarly misleading names have concealed the true diagnosis of vitamin B_1 deficiency in the western world." According to Weiss(16) "it is possible that in the etiology of this condition, just as in alcoholic polyneuritis, nutritional deficiency, particularly chronic deficiency of vitamin B_1 plays a rôle." Rosenbaum and Merritt(17) noted that intensive dietary and vitamin therapy is of great significance in regard to the prospects of survival and complete recovery. They point out, however, that it is not the only factor, since only 11 of their 22 patients who received no special therapy died, "but that it undoubtedly was a life-saving measure in the case of other patients with severe forms who recovered." Several other reports(18,19,20), for the most part undocumented and presenting uncontrolled trials, indicate that thiamin may have specific value in the treatment of the Korsakoff syndrome.

Our own experience with the syndrome convinces us that not all cases of this type result from nutritional disturbances. In the alcoholic variety the evidence for existing nutritional disturbances is fairly good, but even in these cases the rôle of thiamin is still to be determined. Wortis(21) has reported that the confabulatory features of an acute delirium usually clear while the patient is receiving a diet deficient in thiamin. Similarly, Bowman, Goodhart and Jolliffe(22) noted that 11.8 per cent of their Korsakoff patients recovered while they were being maintained with a basal diet without vitamin supplements. They observed that when the onset of the psychosis was acute, that is, associated with delirium or other encephalopathic manifestations, the immediate prospect is serious; but if such patients survive infection, circulatory collapse or encephalopathy, the prognosis for recovery from the Korsakoff psychosis is favorable, in that about 50 per cent recover within one month. They could not, however, establish criteria whereby this early recovery could be predicted. When the disease had an insidious onset the prognosis for survival was excellent, but the psychosis was more chronic in course, and recovery within a month occurred in only about 10 per cent of their subjects even when thiamin was given in adequate amounts. In their cases with acute onset the group that was treated with added thiamin showed an incidence of recovery seven times as great as the control group. They concluded only that further controlled studies were necessary before conclusions could be drawn regarding the rôle of thiamin in the genesis and treatment of the Korsakoff syndrome.

Jolliffe, Wortis and Fein(13) treated 13 patients having Wernicke's syndrome with large amounts of thiamin and other vitamins. All recovered, but 12 were left with a residual Korsakoff syndrome. None of these patients showed any further response to thiamin therapy, and the Korsakoff psychosis persisted.

In the chronic cases reported by Bowman, Goodhart and Jolliffe(22), and in the post-Wernicke cases described by Jolliffe, Wortis and Fein(13), it may be postulated that the metabolic changes had already progressed to a stage of irreversible structural change and that this accounted for the ineffectiveness of thiamin therapy. It would therefore seem that when the onset of the disease is acute, early institution of thiamin therapy may be of value in the Korsakoff psychoses, but is not apparently essential. In the chronic cases the evidence for thiamin is poor, but the possibility of irreversible brain changes must be considered.

The evidence at hand is inconclusive, and the rôle of thiamin in the genesis and treatment of the Korsakoff syndrome still remains to be determined.

Delirium Tremens

Beyond the fact that delirium tremens occurs in severe and chronic alcoholism and that it frequently follows injuries, operations and acute infections, little is known of the actual etiologic factors. Our work at Bellevue was initiated by the empiric observations of Bowman and Keiser(23), who showed that patients with alcoholic delirium did better when fed sodium chloride and orange juice, and when fluids were given abundantly rather than restricted. The study undertaken(24) was an elaborate one, and we shall present only the positive and pertinent findings:

1. There is evidence of nutritional deficiency in patients having delirium tremens. This is based on the following facts: (a) When a reliable history is obtainable, there is almost invariably a background of dietary inadequacy. (b) These patients almost always show a low vitamin C content of the blood and cerebrospinal fluid. (c) Peripheral neuropathy (evidence of thiamin deficiency) is present in about 30 per cent.

2. There is evidence of disturbed carbohydrate metabolism in patients having delirium tremens. This is based on the following observations: (a) These patients invariably show evidence of liver damage. In addition to interfering with carbohydrate metabolism, the detoxifying activity of the liver is therefore undoubtedly disturbed. (b) The blood and spinal fluid lactic acid is increased. This finding, however, is probably related to increased muscular activity.

3. Patients having delirium tremens are obviously dehydrated. Earlier therapies of delirium tremens were based on the fact that at autopsy these frequently revealed cerebral edema. Treatment was therefore directed at dehydrating these patients. This ignored their obvious state of dehydration and manifest toxicity. Our chemical studies revealed, moreover, that the blood chlorides were invariably low. Since chlorides are always excreted as sodium chloride, and since it is well known that the excreted sodium always carries large amounts of water with it, this may explain the dehydration of these patients. Finally, it must be pointed out that while cerebral edema may exist in these patients, the cerebrospinal fluid pressure as measured by the manometer is not increased.

It is now generally accepted that vitamins B and A play a very important rôle in the metabolism of normal nervous tissue. In addition, Wortis, Wortis and Marsh(25) demonstrated that patients in alcoholic delirium have subnormal amounts of vitamin C in the blood and cerebrospinal fluid, a defect not present in alcohol addicts without neurological or mental changes. This work was subsequently confirmed(26). The occurrence of peripheral neuropathy, acute nicotinic acid deficiency encephalopathy, pellagra, and Wernicke's syndrome—all known to be vitamin deficiencies—is not infrequent in delirium tremens. In addition, there are many reports in the literature which indicate that thiamin chloride(27,28,29) and nicotinic acid(30,31,32,33) have definite value in the treatment of delirium tremens. Hence, it would seem justifiable to conclude that nutritional factors are of importance in the production of alcoholic delirium. On the other hand, Spies and his co-workers(3) reported negative results with nicotinic acid in this condition, and Rosenbaum, Piker and Lederer(34), noted no essential difference in their results whether vitamin B_1 and nicotinic acid were given or omitted in the routine therapy of these patients. As a matter of fact, they reported the experimental production of an attack of delirium tremens in a chronic alcoholic who was given huge doses of thiamin chloride and nicotinic acid, but allowed to drink about one quart of whiskey per day. The delirium started about 13 days after this regimen was instituted.

The intricacies of this entire problem and the difficulties in evaluating therapeutic procedures are further accentuated by the following observation: Four patients having delirium tremens were treated with glucose, saline and a diet that was markedly inadequate in the entire vitamin B-complex. Two recovered promptly, the third went on to develop a typical nicotinic acid deficiency encephalopathy, and the fourth developed a typical Wernicke syndrome. The third required intravenous medication with nicotinic acid and the fourth intravenous medication with thiamin hydrochloride and other vitamins before recovery took place. (The latter

was left with a residual Korsakoff psychosis which showed no further response to thiamin therapy.) Before treatment was instituted we could see no essential difference in the condition of these patients or in the degree of involvement. We have repeatedly observed this phenomenon in patients who, admitted to the hospital with delirium tremens, develop other types of encephalopathy requiring specific treatment before recovery sets in.

It seems, therefore, that deficiency of thiamin and nicotinic acid is not specific in the causation of delirium tremens, and that administration of these vitamins is not specific in its treatment. We believe, however, that delirium tremens is a factor of considerable importance in producing other types of nutritional encephalopathy (nicotinic acid deficiency encephalopathy, Wernicke's syndrome, etc.). The delirium, with its marked increase in psychomotor activity, so raises the metabolic requirements of the individual that clinically latent deficiency states may become manifest. If, then, an individual nearly depleted of thiamin or nicotinic acid develops delirium tremens, he is very apt to develop complicating syndromes. It is this type of patient, we believe, who is materially helped by the addition of thiamin and nicotinic acid to his therapeutic regimen. We have, however, seen too many people having delirium tremens recover while maintained with only saline and fluids to include nicotinic acid or thiamin in the specific treatment of this condition. We believe that thiamin and nicotinic acid, as well as the entire vitamin B-complex, should be given to all patients with delirium in order to prevent the development of Wernicke's syndrome or nicotinic acid deficiency encephalopathy, and perhaps to prevent the development of as yet unknown types of encephalopathy related to nutritional disturbances. Delirium tremens may of course be related to deficiency of some as yet undiscovered or untried vitamin, but the evidence for thiamin and nicotinic acid is very meager indeed.

With these factors in mind, Bowman, Wortis and Keiser(35) recently suggested a method for the treatment of delirium tremens which emphasizes the following procedures:

1. Withdraw alcohol abruptly.
2. Give sedative medication judiciously, paraldehyde being preferred, and morphine condemned.
3. Omit restraints unless absolutely necessary.
4. Give carbohydrates in large amounts.
5. Administer sodium chloride in attempt both to combat dehydration and to restore the normal acid-base equilibrium of the body.
6. Provide a high-calory, vitamin-rich diet. In appropriate cases, intramuscular or intravenous vitamin medication should be resorted to immediately.
7. Force fluids.
8. Do lumbar punctures for diagnostic purposes only.
9. Treat complicating or precipitating factors with specific therapy.
10. Give individual psychotherapy according to the needs of the patient.

Finally, a word regarding the mortality in alcoholic delirium. Mortality rates in delirium tremens are very difficult to evaluate. Most authors neglect to give their criteria for diagnosis, and fail to mention the presence or absence of complications. Hence, we find mortality rates ranging from 1.3 per cent(34) to 75 per cent(36). It is our belief that the mortality rate in cases of uncomplicated delirium tremens is almost negligible(37). In the others it is the treatment of the associated disease conditions (head injury, pneumonia, nicotinic acid deficiency encephalopathy, Wernicke's syndrome, etc.) which makes for a low or a high mortality rate. To compare cases of delirium tremens associated with a mild throat infection or a fractured rib, with others associated with head trauma or severe nutritional deficiency is obviously not valid statistically.

Summary and Conclusions

An attempt has been made to evaluate critically the results of nutritional and, more particularly, vitamin studies, as they relate to the clinical syndromes of delirium tremens, the Korsakoff psychosis, Wernicke's syndrome and the various cerebral disorders that result from a deficiency of nicotinic acid. The manner in which chronic alcoholism may produce dietary insufficiency

is briefly discussed. We emphasize the fact that while alcohol is apparently not immediately responsible for most of the observable damage, alcoholism is responsible for these changes. The effect of alcohol per se has still to be evaluated. We accentuate also the frequency with which these pictures merge one into the other, and the fact that vitamin therapy, to be effective, must be instituted before irreversible structural changes have occurred. As in vitamin deficiency diseases occurring elsewhere, those affecting the nervous system are usually the result of multiple rather than single deficiencies. A well balanced diet should therefore always supplement treatment with the specifically indicated vitamin or vitamins.

It is our belief that future studies of the type here reviewed will yield much information of value to students of nervous economy.

BIBLIOGRAPHY

1. Jolliffe, N., and Stein, M. H.: Quart. J. Studies on Alcohol, **1**: 727, 1941.
2. Casal, G.: Quoted by Major, R. H. Classic descriptions of disease, p. 575. C. C. Thomas, Springfield, 1932.
3. Spies, T. D., Aring, C. D., Gelperin, J., and Bean, W. B.: Am. J. M. Sc., **196**: 461, 1938.
4. Matthews, R. S.: J.A.M.A., **111**: 1148, 1938.
5. Sydenstricker, V. P., Schmidt, H. L., Fulton, M. C., New, J. S., and Geeslin, L. E.: South. M. J., **31**: 1155, 1938.
6. Spies, T. D., Grant, J. M., Stone, R. E., and McLester, J. B.: South. M. J., **31**: 1231, 1938.
7. Wortis, H., and Jolliffe, N.: New York State J. Med. (in press).
8. Cleckley, H. M., Sydenstricker, V. P., and Geeslin, L. E.: J.A.M.A., **112**: 2107, 1939.
9. Jolliffe, N., Bowman, K. M., Rosenblum, L. A., and Fein, H. D.: J.A.M.A., **114**: 307, 1940.
10. Wernicke, K.: Lehrbuch der Gehirnkrankheiten, Kassel, **2**: 229, 1881.
11. Alexander, L., Pijoan, M., and Myerson, A.: Trans. Am. Neur. A., **64**: 135, 1938.
12. Alexander, L.: Am. J. Path., **16**: 61, 1940.
13. Jolliffe, N., Wortis, H., and Fein, H. D.: J. Nerv. and Ment. Dis., **93**: 214, 1941 (abstract); Arch. Neur. and Psych. (in press).
14. Korsakoff, S.: Allg. Ztschr. f. Psych., **46**: 475, 1890.
15. Strauss, M. B.: J.A.M.A., **110**: 953, 1938.
16. Weiss, S.: Cecil's textbook of medicine Phila. and London, W. B. Saunders and Co., 1937 (4th edition).
17. Rosenbaum, M., and Merritt, H. H.: Arch. Neur. and Psych., **41**: 978, 1939.
18. Friedmann, A.: Schweiz. Arch. Neur. und Psych., **39**: 263, 1937.
19. Norbury, F. J.: Illinois M. J., **78**: 228, 1940.
20. Brodsky, M. E.: J. Connecticut Med. Soc., **2**: 228, 1938.
21. Wortis, H.: New York State J. Med., **39**: 1178, 1939.
22. Bowman, K. M., Goodhart, R., and Jolliffe N.: J. Nerv. and Ment. Dis., **90**: 569, 1939.
23. Bowman, K. M., and Keiser, S.: Arch. Neur. and Psych. **41**: 702, 1939.
24. Wortis, H., Wortis, S. B., Frank, P., Jolliffe, N., and Bowman, K. M.: Arch. Neur. and Psych., **41**: 655, 1939.
25. Wortis, H., Wortis, S. B., and Marsh, F.: Am. J. of Psychiat., **94**: 891, 1938.
26. Alexander, L., Pijoan, M., Schube, P. J., and Moore, M.: Arch. Neur. and Psych., **40**: 58, 1938.
27. Kiene, H., Streitweiser, R., and Miller, H.: J.A.M.A., **114**: 2191, 1940.
28. Kloster, J.: Nervenarzt, **2**: 413, 1938.
29. Santesson, C. G.: Svenska Läkartidn, **36**: 926, 1939.
30. Pagniez, P.: Pr. Med., **47**: 1682, 1939.
31. Mainzer, F., and Krause, M.: Brit. Med. J., **2**: 331, 1939.
32. May, A. M.: Med. Record, **150**: 124, 1939.
33. Sydenstricker, V. P., and Cleckley, H. M.: Paper presented at American Psychiat. Assn. Meeting, Cincinnati, (May) 1940.
34. Rosenbaum, M., Piker, P., and Lederer, H.: Am. J. Med. Sc., **200**: 677, (Nov.) 1940.
35. Bowman, K. M., Wortis, H., and Keiser, S.: J.A.M.A., **112**: 1217, 1939.
36. Sceleth, C. E., and Beifeld, A. F.: Interstate Med. J., **23**: 408, 1916.
37. Wortis, H.: Quart. J. Studies on Alcohol, **1**: 251, 1940.

THE INCIDENCE AND SIGNIFICANCE OF ALCOHOLISM IN THE HISTORY OF CRIMINALS [1]

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Although the ultimate explanation of the causes of crime is partly dependent on point of view, there is abundant and increasing evidence that social factors in the background and heredity of a criminal are responsible to a considerable extent for the form which his behavior assumes. There is little information about the extent of alcoholism among criminals and that which is available is not recent. The *exact* significance of alcoholism in the production of crime can be determined only by a study of the complete personality of prisoners who are able and willing to offer intelligent assistance, but it should be possible to determine generally from statistical studies in what manner the alcoholic criminal differs from one who does not drink beyond a casual extent.

This study, originally suggested by Dr. Wilfred Bloomberg, is based on the records of 2014 persons who were under the care of the Massachusetts Department of Correction between 1936 and 1939. Through the courtesy of the Commissioner of Correction, Mr. Arthur T. Lyman, it has been possible to examine their records and abstract personal data at time of sentence with especial attention to the factor of alcoholism either in the subject or in his or her family and social history. The cases included were not selected but were taken consecutively from the files of the Department of Correction.

Two penal institutions are represented, the Massachusetts State Prison at Charlestown (all male prisoners) and the Massachusetts Reformatory for Women at Framingham. The cases from each institution have been divided into those with personal histories of excessive alcoholism (by their own admission) and those who disclaim the use of alcohol except occasionally. The drinking habits have been further verified by social service and court data which were carefully recorded in the files of the Department of Correction.

The Massachusetts State Prison Group [2]

The total number of cases from the State Prison totalled 1637 and of these 1086 (66.3 per cent) were considered alcoholic; 551 (33.7 per cent) were non-alcoholic, a ratio of 2:1. The racial distribution was about the same for the alcoholic as for the non-alcoholic group and represents essentially the racial distribution of the state.

The marital status of both alcoholic and non-alcoholic groups represented about the same distribution as seen among the general population although among non-alcoholic subjects there were more unbroken marriages. Half of the entire group (50.1 per cent) were unmarried and 29.9 per cent were married. The ages of the single alcoholic group were for the most part between 20 and 29 years and of the married alcoholics 38 years. The unmarried, non-alcoholic group averaged between 20 and 24 years.

The family history of alcoholism is of considerable interest. Of 1086 alcoholic prisoners, 68.6 per cent had alcoholic relatives. Of these, 62 per cent had alcoholic parents; 26.1 per cent had alcoholic siblings; 2.8 per cent had alcoholic wives and 9.1 per cent had other alcoholic relatives. Among

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Virginia, May 5-9, 1941.

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[2] Drunkenness was not the chief offense of any subject. Men sentenced to penal institutions for this reason are sent to other institutions. However, many of the alcoholic prisoners were dipsomaniacs or intermittent drinkers and some committed their offense against society during an alcoholic spree (see below).

non-alcoholics, 64.6 per cent had alcoholic parents; 21.3 per cent had alcoholic siblings; 1.3 per cent had alcoholic wives and 12.6 per cent had other alcoholic relatives. Six hundred fifty-two (60.0 per cent) alcoholic prisoners, although incarcerated for other crimes than drunkenness had previously been arrested for that offense. Of alcoholic prisoners 14.8 per cent had come from broken homes, although only 20 broken homes were recorded for the non-alcoholic group. Of alcoholic prisoners 34.8 per cent claimed to have been intoxicated at the time of their crime and this was substantiated by other evidence in 248 cases (22.8 per cent). Three hundred eighty-nine (35.8 per cent) claimed to have been under the influence of alcohol but not drunk at the time the crime was committed. One hundred forty-six (13.4 per cent) showed that the chief offense had been committed in an alcoholic setting such as a tavern, bar or in a place where drinking was in progress by the prisoner or his associates.

The domestic relations of the non-alcoholic group were more satisfactory than for the alcoholics. For the non-drinkers 56.4 per cent admitted that the home situation was congenial as compared with 46.4 per cent of the alcoholic group. Of the non-drinkers 21.6 per cent had been in non-congenial living situations before imprisonment and 31.0 per cent of the drinkers characterized their domestic relations as non-congenial.

The intelligence quotient was reported for 764 alcoholic and 379 non-alcoholic prisoners. In the alcoholic group, 52.5 per cent had an intelligence quotient below 79, although only 30.9 per cent of the non-alcoholic group from whom the data was available had an intelligence quotient below this level. The highest education level attained was approximately the same for both groups and the median for the highest grade completed was the seventh year of grammar school. However, more non-alcoholics entered high school or went beyond than did members of the alcoholic group.

The economic status of both groups was about the same except that in the non-alcoholic group 6.7 per cent had been comfortably situated before sentence compared with 1.8 per cent of the alcoholics. Of the alcoholics 67.4 per cent as against 65.1 per cent of the non-alcoholics came from marginal economic circumstances and 30.8 per cent of the alcoholics were dependent compared with 28.1 per cent of the non-alcoholic group.

The physical condition of 94.8 per cent of all prisoners at time of sentence was good although 39 (3.6 per cent) alcoholics and 22 (3.9 per cent) non-alcoholics were in only fair physical condition. Fifteen (1.4 per cent) alcoholics and 10 (2.0 per cent) non-alcoholics were in poor condition but the physical limitations of the former were not related to chronic alcoholism. It may be that they were imprisoned before the neurological complications and deficiency diseases associated with alcoholism could occur. Sixty-eight alcoholics were infected with syphilis (6.2 per cent) and 64 had gonorrhea (5.8 per cent). Three had both venereal infections (0.2 per cent). Twenty-five non-alcoholics had syphilis (4.5 per cent) and 28 had gonorrhea (5.0 per cent) while 1 had both infections.

Crimes against property were approximately similar in incidence among the alcoholics (50.9 per cent) and non-alcoholics (46.3 per cent). *Sex crimes* and *crimes against public order* were the chief offenses in 17.1 per cent of the alcoholic cases and in 20.8 per cent of the non-alcoholic cases. *Crimes against persons* were recorded for 32.0 per cent of alcoholics and for 32.9 per cent of the non-alcoholics. The specific crimes among the alcoholics which were most numerous were (1) breaking and entering with the intent to commit larceny, (2) armed robbery, (3) robbery and (4) rape. Among the non-alcoholic group, they were (1) breaking and entering with the intent to commit larceny, (2) armed robbery, (3) larceny and (4) rape.

The prognosis of prison officials with respect to the satisfactory return of these men to society showed far greater promise for the non-alcoholic group; 33.7 per cent were given a favorable prognosis while only 15.6 per cent of the alcoholic group were so classified. Of the non-alcoholics 46.2 per cent were given unfavorable prognosis compared with 55.6 per cent of the alcoholics. A doubtful prospect was recorded for 17.6 per cent of the non-alcoholics and for 23.9 per cent of the alcoholics.

Most of the prisoners showed a strong tendency toward recidivism. Although few

had been brought in at the beginning of their delinquent careers, there were only 44 men (4.0 per cent) among the alcoholic group and 92 non-alcoholic men (16.6 per cent) without previous prison or court records.

The Massachusetts Reformatory for Women Group

The records of 928 women prisoners ("students") at the Massachusetts Reformatory for Women were examined. Of these, 458 (49.4 per cent) were alcoholic by their admission or by reliable corroborative evidence from the courts or probation officers. Four hundred seventy cases (50.6 per cent) disclaimed the use of alcohol and no evidence from other sources was available to refute the prisoner's statement. The racial distribution, like that found for the male group of prisoners, reflects the distribution in the general population of Massachusetts rather than a particular trend in drinking habits. The figure indicating the marital status of female prisoners show that 41.0 per cent of the alcoholic group were married and 26.2 per cent were single. Marital responsibilities do not seem to be an effective deterrent to anti-social behavior for the married, alcoholic woman. A large number of the women were married before they were eighteen years of age. They were poor home makers and frequently neglected the children and their marital responsibilities. Most of the early marriages were terminated by separation, desertion or divorce.

Native-born alcoholic women in the group studied numbered 68.3 per cent and there were 88.4 per cent among the non-alcoholic group. Foreign-born individuals were almost three times as numerous among the drinkers (31.2 per cent) as among the abstainers (11.0 per cent). Frequently there was evidence of strong conflict between child-parent culture in the native-born children of foreign parents (44 per cent). The low economic status, the poor moral standards, especially when the home environment was alcoholic and the low or absent exercise of parental supervision made a high contribution to early delinquency.

Alcoholic women tended to be older than non-alcoholic women and the median age of the former was 37 years. The median age of the non-alcoholics was 30 years. The majority of alcoholics ranged in age between 20 and 50 years but for the abstainers the largest number were aged between 19 and 30.

The physical condition of the alcoholic and non-alcoholic groups was practically identical. Of the alcoholics 71.1 per cent were in good health; 25.4 per cent were in fair physical condition and 3.5 per cent were in poor health. Among the non-alcoholics, 76.5 per cent were in good health; 20.6 per cent were in fair physical condition and 2.9 per cent were in poor health. Thirty alcoholic women (6.5 per cent) and 22 non-alcoholic women (4.6 per cent) had both venereal infections. There were 8 cases of congenital lues and 1 of central nervous system syphilis among the alcoholics. Venereal disease was most common among the non-alcoholic who were aged between 20 years and 24 years and among alcoholic women between 25 and 29 years.

The median intelligence quotient was 81 for the alcoholic group and 84 for the non-alcoholic group. The average alcoholic woman had completed 7 years of school but this figure was slightly higher for the non-alcoholics.

A cross section of the female cases reported differs markedly from that of the male cases, for unlike the latter, 249 women (50 per cent) had been sentenced to the Reformatory because of drunkenness. (When male offenders are imprisoned for this offense in Massachusetts, they are sent to county houses of correction, to the State Farm at Bridgewater or to the City of Boston penal institution at Deer Island in Boston Harbor). Two hundred sixty-two (57.1 per cent) alcoholic women had previously been arrested for drunkenness and 190 (41.5 per cent) had come from broken or alcoholic homes, either their own or those of parents. Broken homes were reported for 4 non-alcoholic women. Two hundred forty-two (52.8 per cent) admitted they were drunk at the time of their offense. The women of alcoholic habits who had been sentenced for other crimes than drunkenness always denied being intoxicated, although there is considerable doubt as to the accuracy of their statements. This is contrary to the practice of male prisoners who frequently project the responsibility for their behavior on alcoholism. Twenty-three

women (5.8 per cent) had committed their offenses in alcoholic settings such as places where liquor was being sold or consumed. Among the alcoholic women, the mother had been alcoholic in 47 instances (10.2 per cent) and the father in 156 instances (31.8 per cent). Fourteen alcoholic mothers of non-alcoholic daughters (2.9 per cent) and 110 alcoholic fathers (23.4 per cent) are recorded. Forty-six alcoholic women had alcoholic siblings; 3 had alcoholic grandparents; 6 had alcoholic foster or step-parents and 116 had alcoholic husbands (25.3 per cent). Among the non-alcoholic women, 15 had alcoholic siblings; 1 had an alcoholic grandparent; 2 had an alcoholic foster or step-parent and 31 had alcoholic husbands (6.5 per cent). Among single women, the parents had been alcoholic in one-third of the cases and among married women in one-fifth of the cases.

Domestic relations, either in their own homes or in the homes of their parents, were uniformly uncongenial (87.2 per cent for the alcoholics and 91.5 for the non-alcoholics). Congenial home relations are indicated by 9.8 per cent of the alcoholics and 7.3 per cent of the non-alcoholics.

As mentioned above, 248 (54.1 per cent) of the women had been sentenced because of drunkenness and the remainder for other offenses. Forty-three alcoholic women had been sent to the reformatory because of "idle and disorderly" conduct; 31 because of "lewdness in speech or behavior" and 19 because of "neglect or abandonment of minor children" and 19 because of adultery. Fourteen young alcoholic women were "stubborn children," an offense usually invoked at the request or with the cooperation of the parents when minor daughters were beyond parental restraint. One hundred seventeen non-alcoholic women were sentenced because of "lewdness in speech and behavior"; 47 were "stubborn children"; 59 because of larceny; 51 were "idle and disorderly" in conduct and 30 were committed for "neglect or abandonment of a minor child."

In summary, drunkenness accounted for 54.1 per cent of all crimes committed by alcoholic women. Exclusive of that offense, there were 157 offenses (34.2 per cent) that were *crimes against public order,* behavior problems or sex offenses among the alcoholics and 30 (6.5 per cent) were *crimes against the person of others* such as assault, manslaughter or murder. Twenty-three alcoholic women (5.2 per cent) had committed *crimes against the property of others.* Among the non-alcoholic women there were 351 cases (74.6 per cent), offenses that constituted behavior problems, *crimes against public* order, or sex offenses, 53 *offenses* (11.2 per cent) *against the persons of others* and 66 (14.2 per cent) *against the property of others.*

Of the 98 alcoholic female prisoners without previous court or penal record, the average age at time of sentence was 27.3 years. Of the non-alcoholics, 127 had no previous record and their average age was 27 years. 65 were between the ages of 17 and 22 years. The economic status before sentence was generally higher for the alcoholic group of women than for the non-alcoholic group and the prognosis of the reformatory staff was much better for the non-alcoholic group.

Discussion

The data presented above show that among male prisoners, there is little difference in the nativity or marital status of alcoholics and non-alcoholics. The racial and religious distribution corresponds roughly to that for the communities in which they originate. The age distribution does not differ greatly for the two groups nor does the distribution of intelligence quotients and the educational level. The physical and economic status and the incidence of venereal infections at the time of commitment are the same for both groups. The minimum sentence in years is about the same, and the alcoholic commits about the same type of crime as the non-alcoholic, tending more frequently to commit crimes against the property of others than the non-alcoholic. It is in the background, personal and familial, that a distinct difference is noted and in the sphere of domestic relations. The prognosis for the alcoholic group is distinctly less favorable in the opinion of the institution staff than for the non-alcoholic.

Among women prisoners, a different situation obtains because of the large number who have been committed because of excessive drinking without any other offense. This

renders comparison between the sexes unwise. In spite of this fact, the male and female groups differ only slightly in race, again reflecting the racial distribution of the community in which they originate. Considerably more married and foreign-born women are found in the alcoholic group than in the non-alcoholic group. There is a difference in religious affiliation which is of uncertain significance. The ages and physical condition of the two groups are similar. There is, however, a higher incidence of venereal disease among both groups than was observed among the male cases. The educational attainments and intelligence level are about the same for both alcoholic and non-alcoholic women.

A closer correspondence with respect to family alcoholic background is noted among both groups of women than was observed among the men but the alcoholic women have more alcoholic mates than the non-alcoholics. The domestic relations are in closer agreement between the two subgroups than with the male prisoners, being generally uncongenial. Exclusive of drunkenness, which accounts for over half of the offenses, behavior problems and sex offenses are most numerous in both groups. The economic status of the alcoholic women is more favorable than for the non-alcoholics and the marginal status is more common. The prognosis is, as was noted for the men, less favorable for the drinkers.

It does not appear from these data that the alcoholic and the abstaining criminal, either male or female differ very greatly. We find little that might explain why these people fail to adjust to the social and legal restraints which our social system imposes. Glueck expressed a belief as long ago as 1918 that the criminal act was the resultant between a particularly constituted personality and a particular environment. He believed that not all criminal persons were predestined to commit crimes. In addition, there probably is an imponderable factor which we can not uniformly evaluate.

The fact that so many alcoholic men and women who are sentenced to penal institutions come from environments which are shaped unfavorably by the alcoholism of their parents, marital partners and other relatives *suggests that the frustation caused by an alcoholic environment elicits aggressive drives which manifest themselves in the socially inacceptable form of behavior* which we call crime. The deep instinctual drives are diverted, building up severe emotional and mental conflicts which cause further damage to already battered and wavering egos. The normal craving for power and success finds only additional frustation in alcoholism and the ego, lacking the inhibitory restraint of reason and intelligence leads to further conflict with other persons and with the social order. The temper tantrums and other similar neurotic expressions of childhood give way as the individual grows older to aggressive responses against the environment (so-called behavior problems), against other persons and property (assault, murder and robbery, arson and so forth). The latter form of behavior can be considered psychologically a projection of resentment against persons whose economic status is more desirable. The resentment against the inadequacy of the ego may be expressed as sex offenses or in the self-destructive drives of alcoholism, drug addiction, frank psychoses or suicide. Much of this is also true of the non-alcoholic criminal offender but the abstainer finds a different outlet for much of his aggression. The factors of need and opportunity are more important in the situation of the non-alcoholic criminal. A number of alcoholics may be considered emotional criminals exhibiting immature behavior ranging from that consistent with imbecility to outbursts of anger. Alexander has pointed out that the democratic system relies, theoretically at least, on the maturity of its citizen. The more difficult becomes the struggle for existence, the greater is the tendency to follow anti-social patterns of behavior. Delinquency is apparently more frequent among poor than among comfortably situated persons. Accurate statistics on this point are not available, since delinquents from the more adequate social levels are often protected and cared for elsewhere than in reformatories.

The cool-headed intentional violators of the law are especially rare in the alcoholic group. Alcoholics, except under the influence of alcohol, are usually too timid to express their aggressive drives and are more apt to manifest behavior of the hysterical type. The effect of alcohol on personality partially ex-

plains why this occurs. From a pharmacological point of view, ethyl alcohol produces a pseudostimulation which was shown by Schmiedeberg to be due to a depression of the inhibitory or cortical mechanism, possibly resident in the hypothalamus. One of the first effects is an increased lability of the inhibitory and perceptive powers and a diminution in the critical function particularly with relation to personal behavior. The increased self-esteem of the alcoholic and the new conception of his worth causes the subjective need for control to vanish, as Schilder pointed out.

The alcoholic, whether criminal or not, male or female, is deeply conscious of the society around him of which he is not a harmonious part. He is very desirous of love and appreciation. His own inadequacies are very real without alcohol but with it, he becomes insensible of his limitations. He has frequently lived since childhood in a state of insecurity often in relation to parents and siblings, menaced by ridicule, threats, deprivation and even painful punishment. Without the support of alcohol, the alcoholic, actually in need of friendly help and understanding, finds it all too easy to give in passively to real or assumed pressure by overcompensation, and he may express the latter in some form of delinquency or crime. Neither the community nor the family should stress superiority, perfection and blamelessness if it wishes the alcoholic to take his place in it with reasonable promise of adjustment.

We are accustomed to think of alcoholism as an "escape" mechanism but for the alcoholic criminal it may be much more than that. He may be revolting against an intolerable home situation through criminal behavior and contriving unconsciously to escape from it by courting imprisonment. The young criminal may be expressing a wish to escape from those who would impose a rigid and formal pattern of behavior upon him. In a paper written just before his untimely death, Dr. Paul Schilder stated: "The best prevention . . . . lies in the attitude of the parent who does not increase the insecurity and passivity of the child and who guarantees reasonably free development of social adaptation." Extending this concept it can be said that the only cure for crime is a fundamental change in the mores and institutions of our social order which will provide greater security for the individual. This is the ultimate aim of the Federal Social Security program.

In spite of the progress of our communal attitude toward treatment and reform of criminals rather than punishment, the attention we give to the removal of handicapping factors does not keep pace. A good part of the expense of government continues to be spent in the maintenance of penal institutions rather than in housing and health measures. If some aliquot of this cost were spent in preventive educational work, within a short time, the type of individuals who require restraint might change greatly.

There is a pressing need for the application of psychiatric and sociological methods to the problems of penology, whether of alcoholic origin or not. The general attitude of society has tended toward apathy after an offender disappears from the front pages of the newspaper through the prison gates. "We need a social approach to crime and delinquency. We view crime in the abstract with reasonable serenity and emotional balance and with as much intelligence as we bring to bear on most problems. Crime in the concrete and the criminal are viewed with alarm and hysteria, irrationality and helplessness, that is, with sustained thinking."[3] Crime and delinquency will be controlled not by arms but by social and economic forces. The paroled alcoholic criminal must be offered a social group on his release from prison in which the competition is less than that which he knew before commitment.

The purpose of the penal institution is not alone the protection of society but it must, if it is to discharge this function entirely, prepare its charges for their return to society. Psychotherapy in most cases, and especially in those which are complicated by alcoholic factors, is almost an essential. Incarceration alone will not change essential behavior patterns unless there is analysis of the total situation of the criminal followed by treatment during imprisonment and parole.

If psychotherapeutic procedures can not

[3] McCormick, Austin. Yearbook of the National Probation Association. New York, 1936.

be instituted during imprisonment, a part of the parole plan should be the mandatory referral to a psychiatric agency. Few of these exist but there is no valid reason why they should not be established. The psychiatric examination and appraisal need not wait the actual beginning of the sentence. In fact, if this were done while the prisoner was awaiting trial or sentence and the findings made available to the sentencing judge, he might utilize them as a guide to the length and type of sentence. There should be provision for a continuance of recreational outlets after release to counteract the tendency to revert to old companions and haunts and subsequently to old habits. Too much responsibility has been placed upon parolees in the past and too little assistance and supervision have been given them in most states after their release.

A long term view of alcoholism and crime and of the total sociological situations which produce them should provide for the removal of economic and biological handicaps unless society is to support these persons intermittently throughout their lives. There is a need for marital and family guidance and supervision, especially among the groups whose early environment has been defective. This service should not be made available only through the domestic relations courts but should be planned as an educational measure for all young people. Many young alcoholic prisoners both male and female are being punished for offenses whose responsibility rightly reverts to the parents. The casual marriages at early ages, unhappy conjugal relations, the frequency of divorce, desertion, non-support, illegitimacy and venereal disease are all problems which involve family responsibility.

The national morale has been and continues to be seriously undermined by alcoholism on the lower economic and social levels which are poorly equipped to withstand defeatism. Persons in these groups become easy prey to propaganda and disunity follows. The sinister psychological effect of alcoholism increases their insecurity and engenders hatred and suspicion. It is the duty of human society to make a definite effort in the case of criminals to neutralize the differences in social background as much as possible. Preventive measures should be directed at the environment wherever it appears that changes are needed. We are unable at this period in our social development to interfere beyond a minimal extent in the operations of hereditary mechanisms. Only when we shall be able to assure to each new born citizen a good heredity and a superior environment can we hope to place alcoholism and crime among our minor social problems.

BRAIN METABOLISM, VIII

The Effects of Electric Shock and Some Newer Drugs[1]

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Recent attempts to evaluate the effects of drugs like insulin and metrazol, and of the physical agents, nitrogen and electricity as therapeutic aids for the cure of mental illness have focused attention on some of the fundamental aspects of brain metabolism. During the past ten years much has been written about biochemistry of the brain and about its ability to utilize foodstuffs. It appears that every study of brain metabolism should be concerned with basic data such as the nature of the foodstuffs and how they are utilized by the brain; how much and in what concentrations they are burned and further, as in the present problem, what are the effects of various well known drugs and of electric shock in these basic metabolic processes.

In earlier publications the importance of dextrose as the prime brain fuel was emphasized. Subsequently, in 1934, we published (25) the effects of some drugs on brain oxidations, describing some of the more common drug effects. For example, it was shown that "insulin diminishes the oxygen consumption of brain tissue, and this cellular anoxemic effect may possibly account for the clinical symptomatology—confusion, excitement and convulsions—that one sees in hyperinsulinism." Quastel and Wheatley (19) have been particularly interested in the effects of narcotics and other drugs on brain metabolism. Their published works appeared as early as 1932 and 1933.

Although others, especially Langworthy and Kowenhoven in 1930 and Spiegel in 1936, had studied the effect of electric shock on the brain, it remained for Cerletti and Bini in 1938 to perfect the use of ordinary alternating electric current for the induction of convulsions in human subjects.

The studies we are reporting have been designed to evaluate the effects of additional and newer drugs on brain metabolism. Special attention has been focused on the action of the adrenergic and cholinergic drugs.

The following methods of study were used:[2]

1. Injection of the drug in specified concentration into a normal adult male white rat (weight about 250 grams) was made subcutaneously. A period of equilibration of about fifteen minutes was then allowed before the animal's neck was cut across and the brain removed. Respiration of the minced cortex was recorded in the Barcroft-Warburg unit for a period of two hours.

2. Brain cortex of a normal rat was immersed in a Ringer's phosphate substrate containing the drug in a specified concentration and the oxygen consumption measured.

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[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Virginia, May 5-9, 1941.

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This work was aided by a grant to Dr. Donald Shaskan from the Littauer Foundation.

[2] From 3 to 9 determinations were made on all drugs. This is not sufficient for statistical analysis. Certain trends, however, are worth noting. Accumulated oxygen consumption was plotted on semi-logarithmic graphs. (See Charts 1 and 2.) Time in minutes was plotted on the abscissa. Oxygen consumption in cubic millimeters per milligram (wet weight) of normal adult male rat minced cortex, was plotted on the ordinate. These curves were compared to normal curves of untreated rat brain in plain Ringer's phosphate (32 determinations) and in dextrose Ringer's phosphate (26 determinations). Graphs of these untreated animals have been computed by E. M. Jellinek. They have a formula of $y=k+be^{t}$; where "k" is the asymptotic, "b" is the constant, "e" is the base of the natural logarithm and "t" is the time of observation. Although the oxygen consumption in dextrose is definitely increased, the rate of "falling off" at the end of 2 hours is the same as in the plain substrate.

Findings

As noted in Table 1, none of the injected drugs affected the oxygen consumption of the brain in the dextrose substrate. The sympathetic drug, tyramine, and the parasympathetic drugs, picrotoxin, pilocarpine (when used in the concentration noted) stimulated oxygen consumption in the sugar-free substrate.

In the immersion experiments, see Table 2, the sympathetic drugs, adrenalin, caffeine, cocaine, ergotamine and ergotoxine inhibited the oxygen consumption both in the dextrose and sugar-free substrates.

Discussion of Drug Effects

G. A. Emerson, working under comparable experimental conditions with rats, observed that injected adrenalin reduced the auto-oxidation of the brain tissue in plain and dextrose substrates. From our experiments, we were unable to be completely convinced of this, although we found (Table 2) that the depressing effect is marked when adrenalin is added to the substrate (see Chart 4). Interesting in this connection is the work of Marazzi, who has definitely shown that adrenalin inhibits transmission of impulses through the sympathetic ganglia. Darrow and Gellhorn(6) have shown that adrenalin leads to a diminished reflex excitability of the entire sympathetic nervous system, which, Gellhorn believes, is partly due to a damping influence on medullary and hypothalamic sympathetic centers. They also point out that this is the direct opposite of the effect of metrazol. On the other hand, picrotoxin, prostigmine and tyramine appear to stimulate the utilization of oxygen in the plain substrate. In the injected animal, there is no observable effect of the drug on the oxygen consumption of the brain respiring in dextrose substrate.

Quastel and Wheatley in 1932 demonstrated this "impairing" effect of atropine and cocaine. In the same year (1932), we demonstrated that morphine inhibited brain oxygenation, and subsequently in 1940 Wortis, Bowman and Goldfarb reported that morphine decreased the oxygen arteriovenous difference of the brain.

In considering the curves of the accumulative oxygen consumption of these drugs (viz: adrenalin, caffeine and cocaine) which depressed respiration the most, one can observe that there is no increased tendency of the curves toward becoming asymptotic. Rather the respiration starts at a lower level and continues depressed. This is physiological evidence against these high concentrations being the cause of cell destruction.

Electrically Induced Convulsions

Using electricity, one can induce convulsions in rats by placing electrodes on each side of the head and sending current through the brain. A typical tonic and clonic convulsion can be induced using 30-700 milliamperes (usually 50-100) and 120-145 volts when applied against a resistance of 600-4000 ohms for 0.1 second.

The brain metabolism was studied following a single convulsion and following repeated shocks. While the rat was still in coma, after a single electrical shock in one group of animals, the brain was removed. Respiration of the tissue in dextrose-Ringer's phosphate substrate, was more markedly impaired than in the plain substrate, although it will be noted that the respiratory curve fairly clearly followed that of normal brain tissue. The respiratory quotient remained at unity. The total brain respiration is depressed in electrically convulsed animals as compared with normal brain tissue. (See Charts 1, 2, 3.)

In a second group of rats, a total of 9 to 15 convulsions were induced at a rate of 2 shocks a week. The brains of these animals were examined from three to thirty days after their last convulsion. The results were similar to those obtained with the single shock, *i. e.*, the repeated electrical shocks caused a relatively greater metabolic depression in both the plain and dextrose substrates (see Charts 1 and 2 for comparison of single and repeated shocks).

Discussion

The extra oxygen uptake by brain tissue in the presence of dextrose is familiar to all those who have followed the work in the field of brain microrespiration. In general, it may be said that dextrose protects the cell from

TABLE 1

OXYGEN CONSUMPTION IN CUBIC MILLIMETERS PER MILLIGRAM OF WET WEIGHT OF MINCED BRAIN TISSUE FROM MALE ADULT RATS (WEIGHT ABOUT 250 GRAMS) INJECTED WITH ONE OF THE FOLLOWING ADRENERGIC OR CHOLINERGIC DRUGS

Drug	Dose in grams	Oxygen consumption: Plain Ringer's phosphate, pH 7.4 — 60 min.	120 min.	Effect	Ringer's phosphate with 0.2 per cent dextrose — 60 min.	120 min.	Effect
Acetyl-beta-methylcholine	0.0025	0.88	1.40	None	1.21	2.28	None
Adrenalin	0.001	0.71	1.12	None			
Eserin	0.0025	0.85	1.39	None	1.29	2.50	None
Morphine	0.03	0.93	...	None			
Picrotoxin	0.00001	0.92	1.60	S?	1.23	2.26	None
Pilocarpine	0.001	0.85	1.33	None	1.11	2.13	None
Prostigmine	0.0025	0.91	1.47	S.?	1.24	2.33	None
Tyramine	0.01	0.92	1.50	S?	1.17	2.11	None
Water	1.00	0.73	1.22	None	1.35	2.45	None

TABLE 2

THE EFFECT OF THE DRUG IN THE RINGER'S PHOSPHATE SOLUTION ON THE OXYGEN CONSUMPTION (CUBIC MILLIMETERS PER MILLIGRAM) OF MINCED ADULT MALE RAT BRAIN (WET WEIGHT)

Drug	Concentration gram per cent in substrate	Oxygen consumption: Plain Ringer's phosphate, pH 7.4 — 60 min.	120 min.	Effect	Ringer's phosphate with 0.2 per cent dextrose — 60 min.	120 min.	Effect
Acetyl-beta-methylcholine	0.02	0.62	1.11	D?	1.10	2.07	D
Adrenalin	0.1	0.26	0.34	D	0.41	0.60	D
	0.01	0.46	0.70	D	...	...	.....
	0.001	...	...	.....	...	...	.....
	0.000001	0.85	1.26	None	1.0	...	.....
Atropine	0.01	0.81	1.23	None	1.03	2.04	D[1]
Caffeine	0.1	...	...	.....	0.94	1.72	D
	0.3	...	...	.....	1.04	1.90	D
	0.5	0.53	0.88	D	0.98	1.47	D
	1.0	...	...	.....	0.74	0.99	D
Cocaine	0.1	...	...	.....	1.08	2.00	D[1]
	0.3	...	...	.....	1.06	1.91	D
	0.5	0.43	0.60	D	0.90	1.79	D
	1.0	...	...	.....	0.98	1.39	D
Eserin	0.2	0.79	1.26	None	...	...	.....
Ergot hydrocrylate	0.007	0.54	0.69	D	...	...	.....
	0.003	1.01	1.68	S	...	...	.....
Ergotoxin	0.1	0.71	0.98	D	...	...	.....
	0.01	0.70	1.19	None	1.06	2.04	D
Morphine	0.032	0.68	1.15	None?	1.20	2.32	D
	0.008	0.79	1.33	None	1.08	2.17	D
Nicotine	0.1	0.65	0.99	D?	...	...	.....
	0.02	0.77	1.26	None	1.23	2.41	None
	0.008	0.77	1.37	None	1.10	2.27	None
Picrotoxin	0.025	0.83	1.38	None	1.28	2.43	None
Pilocarpine	0.2	0.77	1.58	None	...	...	.....
Prostigmine	0.0025	0.65	0.97	D?	...	...	.....
Tyramine	0.02	0.72	1.09	D?	...	...	.....
Normal (32 determinations)							
Upper limit		0.94	1.57	.....	1.63	3.30	.....
Lower limit		0.65	1.08	.....	1.09	2.11	.....

None: no demonstrable effect; S: stimulation; D: depression.
[1] Confirmed by Quastel and Wheatley.

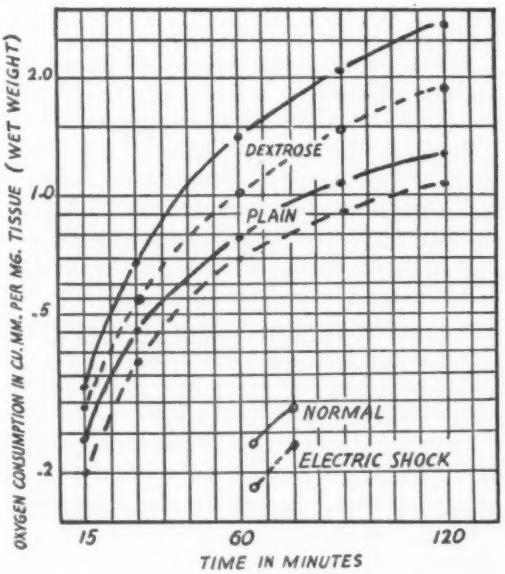

CHART 1.—The effect of repeated electric shock on the oxygen consumption of a rat brain in plain and dextrose Ringer phosphate is compared with the normal.

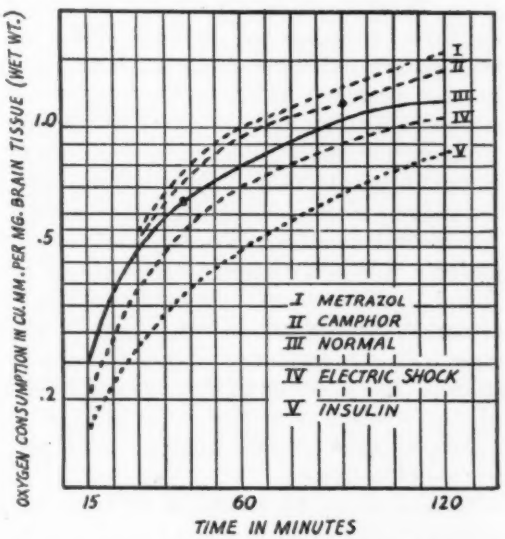

CHART 3.—The comparative effect of electric shock, metrazol, insulin and camphor convulsions on the oxygen consumption of rat brain in plain Ringer phosphate.

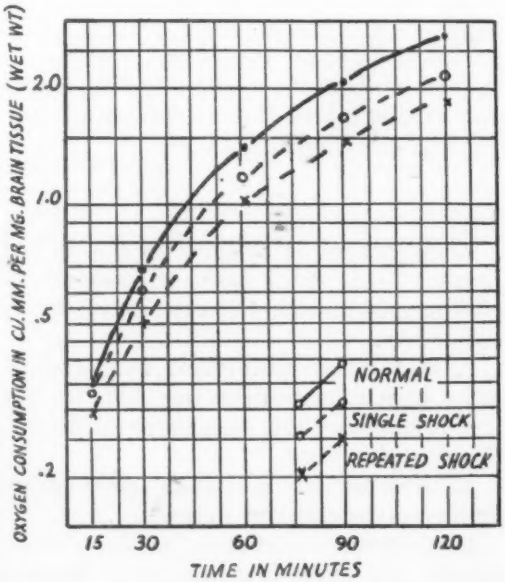

CHART 2.—The effect of single and of repeated electric shock on the oxygen consumption of rat brain in dextrose Ringer phosphate is compared with the normal.

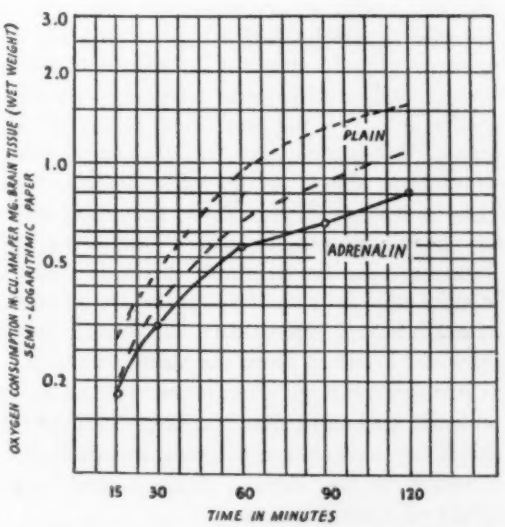

CHART 4.—Comparison of a representative curve of the oxygen consumption of normal rat brain tissue in adrenalin substrate with the highest and lowest curves of 32 determinations in plain Ringer's phosphate.

the depressing or noxious effect of harmful drugs.

Following electric shock, the brain suffered some disturbance in its ability to oxidize dextrose, although the dextrose effect was still present. Repeated convulsions had a greater inhibitory effect on the oxygen consumption than a single shock. Other workers studying the effects of electric shock on the electroencephalogram in rabbits were unable to find any electroencephalographic changes. However, Barrera and Pacella, working with patients who were given electric shock fits, found an essential pathological feature in the electroencephalogram which showed slow potentials of a frequency of 3 to 6 cycles per second. The presence of these waves, in view of our studies, may well be related to the metabolic brain changes induced by the electric shock treatment.

In comparing the effects of various forms of shock therapy, in terms of the brain tissue oxygen utilization as studied by the Barcroft Warburg method, the comparative effects are as follows: Metrazol and camphor increase the respiratory metabolism of the tissue. Electric convulsions interfere with the respiration, and insulin interferes to a greater extent than does the electric shock. In the case of insulin we are of course dealing with the effects of the lack of dextrose, for we have previously shown that insulin itself in direct contact with brain tissue has no deleterious effect on the brain respiratory metabolism. We assume that the depressive effect of electric shock is due to a phenomenon (like a surface phenomenon due to changes of electric potential) which keeps the cell from utilizing the available dextrose. While insulin may depress the respiratory quotient of brain tissue, below unity, the electric shock does not lower it from the value of unity.

From physiological evidence, one can agree with the statement that "probably neither the shock nor suspension of brain metabolism is common to the various physiological treatments of mental disease."

Hypoglycemia itself leads to a general decrease in cortical activity. Metabolically, it is reflected in decreased oxygen uptake (11). Electroencephalograms (13) and electrocorticograms (12) show typical defects with sugar deprivation. These are, progressive decline in alpha wave frequency and an increase in the delta index. Psychologically there is a slowing and an inaccuracy of mental functions.

Hypoglycemia first causes excitement of the central nervous system. Depression follows. Sweating, extensor spasms, motor activity and the sign of Babinski occur. Deep coma is constantly accompanied by greatly diminished oxygen uptake. A relatively severe effect of prolonged glucose deprivation occurs (23). Clinically it is known as irreversible coma. Here glucose alone does not restore consciousness, a transfusion of whole blood being necessary—the whole blood evidently supplying other enzyme factors essential to normal brain metabolism.

These studies are not intended in any way to emphasize or challenge the clinical therapeutic results of the various shock therapies. They merely show the drug effects and some physical effects on the brain tissue metabolism of various agents used in the shock therapies as studied by the Barcroft Warburg method of tissue metabolism.

We of course realize that studies of oxygen metabolism of brain tissue cover only one small aspect of the total problem of brain metabolism. There are many other metabolic factors that require consideration such as the anaerobic metabolism, the vitamin, enzyme and metallic metabolism of the brain in normal and pathological states.

Conclusions

1. Adrenalin, caffeine and cocaine, in high concentrations in the dextrose substrate, inhibit oxygen uptake, whereas nicotine has no such effect.

2. Picrotoxin, prostigmine and tyramine when injected subcutaneously into the rat, tend to increase brain oxygen uptake in plain Ringer's phosphate.

3. Dextrose has a protective action against the depressive effect of drugs.

4. Electrical convulsions inhibit oxygen uptake; this effect is greater after repeated shocks and is more marked in the dextrose substrate.

5. Electrical convulsions and to a greater extent, insulin, interfere with oxygen uptake, in contrast to metrazol and camphor which are metabolic stimulants. The availability or

utilizability of dextrose by the brain may account for this difference.

BIBLIOGRAPHY

1. Almansi, R., and Impastato, D. J.: Electrically induced convulsions in the treatment of mental disease. New York State J. Med., **40**: 1315, Sept. 1940.

2. Barcroft and Richter: J. Physiol. Chem., **35**: 5, 1931.

3. Barrera, S. E., and Pacella, B. L.: Electroencephalographic findings associated with electric shock therapy in patients with mental disorder. Proc. Am. Physiol. Soc., (p. 18), April 1941.

4. Cerletti, U., and Bini, L.: L'electroshock. Boll. Acad. Med. Roma, 136, 1938.

Bini, L.: La Technica e Le Manifestioni del L'electroshock. Riv. Sper. Fren., **64**: 102, 1940.

Centini, D., Bandettini, D., Poggio, A.: Ricerche Biochimiche in Schizofrenici Durante L'Electroshock. Rassegna Stud. Psichi., **38**: 875, Nov.-Dec., 1939.

5. Clark, A. S.: The mode of action of drugs on cells. London, Edwin Arnold and Co., 1933.

6. Darrow, C. W., and Gellhorn, E.: The effect of adrenalin on the reflex excitability of the autonomic nervous system. Am. J. Physiol., **127**: 243, Sept. 1939.

7. Emerson, G. A.: Proc. Soc. Exptl. Biol. and Med., **33**: 171, 1935.

8. Gellhorn, E.: The influence of variations in blood sugar on the functions of the brain. Amer. J. Psychiat., **97**: 1204, March, 1941.

9. Gerard, R. W., and Libet, B.: Action of drugs on potentials of the isolated frog brain. Amer. J. Physiol., **126**: 500, 1939.

10. Himwich, H. E., Bowman, K. M., Wortis, J., and Fazekas, J. F.: The insulin treatment of schizophrenia. J. Nerv. and Ment. Dis., **89**: 273, March, 1939.

11. Himwich, H. E., Frostig, J. F., and Hadidian, Z.: The mechanism of symptoms of insulin hypoglycemia. Am. J. Psychiat., **96**: 371, 1939.

12. Hoagland, H., Himwich, H. E., Campbell, E., Fazekas, J. F., and Hadidian, Z.: Effects of hypoglycemia and pentobarbital sodium on electrical activity of cerebral cortex and hypothalamus (dogs). J. Neurophysiol., **2**: 276, July 1939.

13. Hoagland, H., Rubin, M. A., and Cameron, D. E.: The electroencephalograms of schizophrenics during insulin hypoglycemia and recovery. Am. J. Physiol., **120**: 559, Nov. 1937.

14. Jellinek, E. M.: Personal communication.

15. Langworthy, O. R.: Abnormalities produced in the central nervous system by electrical injuries. J. of Exper. Med., **51**: 943, June 1930.

Langworthy, O. R., and Kouwenhoven, W. B.: Exp. study of abnormalities produced by electricity. J. Indus. Hygiene, **12**: 31, Feb. 1930.

16. Doewenbach, H., and Lyman, R. S.: The electroencephalogram in electrically induced convulsions in rabbits. J. Neurol. and Psychiat., **3**: Oct. 1940.

17. Marazzi, A. S.: J. of Pharmacol. and Exper. Therapeutics, **65**: April 1939.

18. Page, J. D.: Studies in electrically induced convulsions in animals. J. Comp. Psychol., **31**: 181, Feb. 1941.

19. Quastel and Wheatley: Biochem. J. **27**: 1609, 1933. Proc. Roy. Soc. London B, **112**, 60, 1932.

20. Saslow, G.: J. Cell. & Comp. Physiol., **10**: 385, 1937.

21. Spiegel, E. A.: J. Lab. and Clin. Med., **22**: 1274, 1936.

22. Takahashi: Okayma Igakki Zasshi, **429**: 1020, 1925.

23. Wortis, J.: Physiological events in the shock theatment of the psychoses. Trans. Bellevue Neurol. Conf., March 19, 1941.

24. Wortis, J., Bowman, K. M., and Goldfarb, W: Human brain metabolism. Am. J. Psychiat., **97**: 552, Nov. 1940.

25. Wortis, S. B.: Brain metabolism, I. Am. J. Psychiat., **90**: 717, Jan., 1934. Brain metabolism, II. Arch. Neurol. & Psychiat., **33**: 1022, May 1935. Brain metabolism, IV. Amer. J. Psychiat., **93**: 87, July, 1936. Brain metabolism, VII. New York State J. Med., **38**: 14, July 15, 1938.

PROGNOSTIC CRITERIA IN SCHIZOPHRENIA

A Critical Survey of the Literature [1]

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In view of the very large number of publications on the different phases of schizophrenia, the study of the course and prognosis of this disease has received relatively little attention. This lack of emphasis on prognostic aspects has probably been due for the most part to the present state of uncertainty and disagreement with respect to criteria for the assessment of prognosis. The present review was undertaken in an attempt to clarify to some extent the significance of criteria for the establishment of prognosis in schizophrenia.

A survey of the available and relevant literature reveals that varying degrees of prognostic value are attributed to the following criteria: (1) age at onset, (2) duration of the present psychosis, (3) previous attacks, (4) sex, (5) hereditary background, (6) body type, (7) pre-psychotic personality and adjustment, (8) psychosexual history, (9) type of onset of psychosis, (10) exogenic precipitation factors, acute symptomatology including (11) element of confusion and (12) atypical symptoms, (13) presence of process symptoms, (14) classification of sub-type, and (15) course in the hospital.

1. Age

While Kraepelin(24), Braatoy(6), and Gerloff(10) conclude that earlier onset offers a more favorable prognosis, Forel(9) states that the older the age of onset away from puberty, the better the prognosis. Mauz(34) emphasizes the possibility of a catastrophic outcome in his schizokaria type which constitutes about 15 per cent of the 1050 cases he reviewed and which begins generally between the age of 16 and 25, especially between 19 and 21. Malamud and Render(32) examined 309 schizophrenics and found that onset in the second and fourth decades was favorable, while onset in the third decade and particularly after the age of 40 was unfavorable in outcome. Guttman, Mayer-Gross and Slater(11), following their study of 188 cases of spontaneous remissions, felt that onset at age 20 or less has a better prognosis than onset at a later date. However, they added that from a statistical point of view the effect of age on prognosis is uncertain. In his detailed katamnestic follow-up of 100 cases, Langfeldt(26) concluded that onset later in life is generally better, although early age of onset is not always unfavorable, and late age does not always protect against an unfavorable course. Stalker(42) reviewed 129 cases and was unable to attach any prognostic importance to the age of onset. Rupp and Fletcher(40) in their follow-up study of 608 patients, also found no bearing between the age and prognosis, except that illness beginning after the age of 45 had a less favorable outcome than that beginning earlier in life.

From the above review of the literature, it appears that there is no clear relationship between age of onset and prognosis. Therefore the factor of age cannot contribute greatly in prognostic assessment, except in the infrequent cases that begin after 40 or 45 to which are generally attributed an unfavorable prognosis. At all events, the age of onset of psychosis would seem to have prognostic importance only if it is considered in relation with the sub-types of schizophrenia. For example, since the hebephrenic and simple types occur earliest and the paranoid type latest, onset of illness in the fourth decade would be considered late for the former types, but not at all unusual for the paranoid type.

2. Duration of Illness

Most authors agree that the shorter the duration of illness, the more favorable is

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the outlook, and conversely, as the length of time of illness increases, the prognosis becomes worse. Bond(4) emphasizes the importance of early treatment of mental disease in order to obtain the most recoveries. Hunt, Feldman and Fiero(17) reviewed 641 cases of schizophrenia with the following results: improvement was noted in 55 per cent of 166 cases ill for less than 6 months; in 34 per cent of 150 cases ill for 6 to 18 months; and in 25 per cent of 330 cases whose duration of illness was more than 18 months. Rupp and Fletcher(40) cite figures which, though slightly lower, follow a similar trend. Guttman, Mayer-Gross, and Slater(11) found a very high spontaneous recovery rate of 35 per cent in patients who had been ill a year or less. Taylor and Von Salzen(46) report an improvement rate of 54 per cent in patients sick for two years or less. Stalker(42) also found recent onset of illness to be of favorable prognostic import. Whitehead's(47) review emphasized the lack of recoveries in those sick for more than 18 months. Mauz(34), considering catastrophic as well as the episodic types of schizophrenia, showed that in practically all cases which went on to personality disintegration, this occurred within three to four years after onset of illness.

Since there is unanimity of opinion concerning the relationship between duration and outcome of illness, this prognostic criterion must be considered of major importance. All evidence seems to indicate that there is an inversely proportional relationship between favorable prognosis and duration of illness.

3. Previous Attacks

Blair(2) concludes from his comprehensive review of the literature that spontaneous remissions occur in approximately 40 per cent of all schizophrenic cases, whereas 60 per cent remain unimproved or deteriorate. Patients with a history of previous episode of illness have a better chance of remission, for about 50 per cent of the total number of relapses are temporary and 50 per cent permanent. He points out that single remissions are the most common, double cases less common and that more than two remissions are comparatively rare. Forel(9) emphasizes that the larger the number of years between remission and relapse, the better the prognosis. Malamud and Render(32) state that previous episodes of a type different from the present attack are likely to influence the prognosis in a favorable direction. In his comparative study of recovered and deteriorated schizophrenic patients, Kant(20) emphasizes the quality of the remission, stating that those patients who had more than one psychotic episode and finally recovered, had been apparently completely well between their attacks. In reference to long-range prognosis, Mauz(34) believes the third attack to be the critical point wherein the fate of the patient is determined: either the disease progresses to final, irremediable deterioration, or if this fails to occur, such an outcome is no longer to be feared in the future course. Rennie(39) concludes from his follow-up of 500 patients that, while relapses occur frequently in discharged patients, this does not necessarily affect the final outcome.

Thus, the history of previous attacks of mental illness seems to be of some prognostic significance. The outlook for the patient seems to be more favorable, the longer the interval of time between attacks, the more complete the recovery during the preceding remission, and the greater the dissimilarity between the present and previous episodes.

4. Sex

Kraepelin(24) believed that no definite conclusions could be drawn about the significance of sex as a factor in the outcome of schizophrenia. Stalker(42) also ascribed no prognostic value to the patient's sex in his investigations. Females were found to have a more favorable prognosis by Guttman, Mayer-Gross and Slater(11) and likewise by Rennie(39). On the other hand, Malamud and Render(32) found that recoveries in males showed a slight preponderance over those in females.

From the above one may conclude that the rôle which sex plays in the prognosis of schizophrenia is very uncertain.

5. Hereditary Background

Myerson(37) states that "schizophrenia rests on a constitutional basis which is in

the main hereditable. But neither the mechanism by which heredity works in schizophrenia nor the environmental factor that plays a part is known." Lewis(30) says that hereditary guides to prognosis are dubious, except for the indications afforded in rare instances by two affected parents or by an affected uniovular twin. Gerloff(10) and Stalker(42) attribute no prognostic value to positive or negative family histories. Malamud and Render(32) find that a positive family history has no significance or tends to be conducive to recovery rather than deterioration. On the other hand, Lemke(28) states that the prognosis is worse when the inheritance is tainted, especially when there is a direct family history of schizophrenia. Leonard(29) finds that inheritance plays a smaller part in typical than in atypical schizophrenia. Langfeldt(26) comes to a similar conclusion, stating that while the inheritance of insanity does not seem to have any decisive influence on prognosis, nevertheless the occurrence of insanity in direct ascending or collateral lines seems to be a favorable factor. He presumes that "cured cases have been atypical in which hereditable admixtures from other groups of psychoses are probable." In support of these conclusions, Hunt and Appel(16) observe that the heredity is worse in recovered "schizoaffective" patients than in the unrecovered. Kant(21) studied the incidence of psychoses in the families of recovered and deteriorated schizophrenics and found the proportion between manic-depressive disease and schizophrenia to be nearly 5 to 1 in the recovered and approximately the reverse, 1 to 5, in the deteriorated group.

At the present time the importance for prognosis of positive or negative family history cannot be clearly evaluated. Nevertheless it appears that the incidence of manic-depressive psychosis in the hereditary background may be related to the development of atypical symptoms, and that both of these factors may influence the prognosis in a favorable direction.

6. Body Type

In considering this factor, most authors accept the following categories of Kretschmer(25): (1) asthenic, (2) athletic, (3) dysplastic, and (4) pyknic. Kretschmer pointed out the greater prevalence of the first three types, especially the first, and the infrequency of the fourth type in schizophrenia. He also stated that the outcome appeared to be less favorable in the pyknic type. Mauz(34) confirmed Kretschmer's conclusions. However, he did not find one pyknic habitus among more than 150 schizophrenics whose course was catastrophically downhill and therefore emphasized that pyknic habitus precludes schizokaria. Both Langfeldt(26) and Schmidt(41) disagree with this unequivocal conclusion since they observed the occurrence of catastrophic schizophrenia in pyknic types. Langfeldt believes the factor of body build to be very important and reports that of 19 cases with asthenic habitus and schizoid temperament, 14 went rapidly downhill. Strauss(43) says, "It may be stated with some certainty that the pykno-somatic physique reduces the probability of terminal dementia and favorably influences the degree of residual mental defect." Kant(20) also concludes that pyknic physique is a criterion for more favorable outcome, occurring five times more frequently in the recovered than in the deteriorated patients of his series. Lemke(28), on the other hand, could find no relationship between body type and prognosis. Malamud and Render(32) diverge still further from the general opinion by stressing the unfavorable prognostic significance of the pyknic habitus. They believe that the normal and athletic types influence the prognosis favorably.

It may be concluded, therefore, that body type probably plays a rôle as a prognostic factor, but perhaps only in the very definitely asthenic and pyknic types—unfavorably in the former, favorably in the latter. In the other less extreme categories, it does not appear that any generalizations can be drawn. The strikingly wide variations in the percentage of different body types as tabulated by individual observers is pointed out by Kolle(23) after a review of the findings of a number of authorities. It is most probable, as Kolle believes, that a significant source of error in these studies is insufficient standardization of techniques, and that, therefore, caution is in order in evaluating the prognostic significance of body type.

7. Pre-Psychotic Personality and Adjustment

Temperament and Mental Make-up.—It is generally agreed that in schizophrenia there is a prevalence of the type of personality described by Hoch(14) as "shut-in," and by Jung(18) as "introvert"—or according to present terminology as "schizoid." Occurring with much less frequency among schizophrenics is the "extravert" or "cycloid" type. There is further general agreement that the outlook in the last named categories is relatively more favorable. The combination of introvert temperament and asthenic body build tends to make the prognosis ominous, according to Kretschmer(25), Mauz(34), and Langfeldt(26). Extraversion was found nine times more frequently among Kant's(20) recovered patients than in the deteriorated group. Lemke(28) classifies conspicuous personality traits into two categories: (1) those characterized by easy irritability and excitability, asocial behavior, peculiar make-up, frigidity of mood, irresponsibility and paranoid trends; and (2), those characterized by moodiness, inconstancy, withdrawal and oversensitivity. He believes that features enumerated in the first category are much more accurately noted by the patient's family and are therefore to be considered as being more valid observations when compared with those described in the second category. He further found that in cases in which the outcome was favorable, the patients with neutral pre-psychotic personalities appeared six times more often than those with conspicuous traits, whereas in unfavorable cases the latter were present in a majority of the patients.

Pre-Psychotic Reaction.—Marked emphasis is put on this factor as significant in prognosis by Adolf Meyer's school. The ability to deal with the problems and exigencies of life in an adequate manner is shown to be definitely favorable, whereas fumbling, inadequacy of reaction, withdrawal, indulgence in day-dreaming—the "dereistic thinking" of Bleuler(3)—are unfavorable features. Stalker(42), Henderson and Gillespie(13), Mauz(34), and Strauss(43) all agree that the prognosis is bad in the latter group. Hunt and Appel(16) found that the recovered group had shown much better total personality adjustments to their environment than the unrecovered when they reviewed a number of patients classified as "schizoaffective."

Education and Abilities.—Review of the literature reveals only a few attempts to correlate education and abilities with prognosis. Langfeldt(26) states that the prognosis is not improved by high I. Q.; that, on the contrary, clever people with schizoid temperament have a particularly bad outlook. However, he disagrees with Mauz(34) when the latter points out that schizokar symptoms are more common in the more highly educated and intelligent classes. Opposing these views, Malamud and Render(32) claim that an I. Q. of more than 105 tends to make the prognosis more favorable, as contrasted with an I. Q. of less than 100 and scatter of more than four years. Lewis and Blanchard(31) conclude that education and intelligence have no particular bearing on the outcome. This belief is shared by Bowman and Raymond(5). Kahlbaum(19) stated that the factor of intelligence did influence the outcome significantly, while Stalker(42) found no importance in the factor of education.

It may be concluded from the above discussion that extravert temperament and adequate pre-psychotic life-adjustment offer a more favorable outlook, in contrast to introversion and inadequacy of reaction to life situations. However, it should be emphasized that evaluation of pre-psychotic personality on the basis of information obtained from relatives and friends is at best only approximate. The relationship of education and intelligence to prognosis is very uncertain, and no definite significance can be ascribed to these criteria.

8. Psycho-Sexual History

Many authors have emphasized that a large portion of schizophrenic patients had shown little or no interest in the opposite sex prior to the onset of illness. Lewis and Blanchard(31) point out the numerous sexual abnormalities (prolonged masturbation, overt homosexuality, incest, etc.) found in their review of the histories of 100 recovered cases. Malamud and Render(32) believe that married civil status tends to a

more favorable outcome, as opposed to single civil status.

It may be said, in agreement with Blair(2), that a perusal of the literature shows the psycho-sexual history in itself to be of little help towards prognosis. This factor should, however, be taken into consideration in the evaluation of the general pre-psychotic reaction to life.

9. Type of Onset

Schizophrenia coming on suddenly and acutely has a more favorable prognosis than that coming on gradually and insidiously. There is almost complete unanimity on this point as noted in the observations of Meyer(35), Sullivan(45), Barrett(1), Strecker and Willey(44), Malamud and Render(32), Stalker(42), Bleuler(3), Kant(20), and Gerloff(10). Only one dissenting opinion is noted—that of Horwitz and Kleimann(15) who could find no consistent prognostic value in type of onset in their study of 170 cases. Henderson and Gillespie(13), while agreeing with the general trend, point out their observation of cases with acute onset which had a progressively downhill course.

Mode of onset plays a significant rôle in prognosis, sudden onset having a more favorable outlook.

10. Exogenic Precipitating Factors

Among exogenic precipitating factors Langfeldt(26) includes psychic traumas (love affairs, unemployment), physical traumas (operations, head injuries), infections, alcoholic abuse and child-birth, and finds a higher incidence of these factors immediately prior to onset of illness among recovered cases. Kraepelin(24) described imprisonment as a precipitating moment in 6 per cent of all his male cases. Malamud and Render(32) stress the importance of definite precipitating events, and emphasize especially physical, sexual and economic factors. The assessment of environmental and psychogenic causes against constitutional factors is necessary, according to Stalker(42) and a preponderance of the former over the latter is definitely favorable. Wooton, Armstrong and Lilley(48) question the importance of pregnancy or the puerperium as precipitating factors. On the other hand Zilboorg(49), among others, reports on schizophrenia occurring during pregnancy and following child-birth, and finds that although the prognosis is generally favorable the outcome is frequently poor. Likewise Mapother(33) described schizophrenia following head injuries and emphasizes that the prognosis is not always favorable. Strecker and Willey(44) conclude from their study of 38 cases that terminated in recovery: "The precipitating situation needs to be considered in regard to its intrinsic seriousness, its somatic and psychogenic elements, its acuteness or chronicity, and the possibility of its correction. If the precipitating situation is significant and the psychotic content reflects it, then the psychosis may be benign, even though the symptoms in themselves have a sinister aspect." Finally, Kant(20) reports the feature of psychogenic precipitation in 15 per cent of deteriorated as compared with 74 per cent of recovered patients.

Review of the literature shows almost universal agreement that obvious exogenic factors tend in general to influence prognosis favorably.

11. Confusion

Confusion or clouding of consciousness is considered by Langfeldt(26) and by Muller(36) to be a component of the atypical schizophreniform group. They feel that its presence decreases the significance of "process symptoms"—*i. e.*, what the observer calls process symptoms may not necessarily be endogenous, but rather end-results of exogenic agents which also produce clouding of consciousness. In the presence of confusion, "deterioration" may also be incorrectly assessed. As Strecker and Willey(44) point out: "Toxicity or exhaustion may complicate a benign psychosis and falsely impart to it a guise of deterioration. This may result when affective expression is disturbed by intercurrent clouding of consciousness." Thus, if the element of confusion is present, the prognosis becomes more favorable. This point of view is corroborated by the findings of Malamud and Render(32). Likewise Hunt and Appel(16) showed that confusion

was a symptom occurring in the majority of patients who recovered from a schizoaffective disorder, whereas most of those who did not recover had a clear sensorium. Similarly, clouding of consciousness occurred almost nine times as often in the recovered as in the deteriorated group studied by Kant(20). Horwitz and Kleiman(15), on the other hand, are unable to attach any prognostic value to the presence of confusion.

There is thus general concurrence that the presence of confusion or clouding of consciousness is a favorable prognostic criterion. Conversely, one may say that absence of the element of confusion in the presence of definite "process" symptoms (discussed below) is indicative of endogenous schizophrenia and of ominous prognosis.

12. Atypical Symptoms

Langfeldt(26) studied 100 atypical cases of schizophrenia and found that of 17 cases which recovered, 11 presented atypical schizophreniform symptomatology marked by strong admixtures of manic-depressive, psychogenic and symptomatic trends and pathoplastic symptoms. In a later publication(27), he states that "indefinite schizophrenia," as differentiated from "definite schizophrenia" (characterized by massive symptoms of influence and derealization), generally shows spontaneous recovery in a shorter or longer period of time, mostly within a year. Except for a few episodic cases, the spontaneous recovery is permanent. Hunt and Appel(16) conclude that the recovery rate of schizoaffectives is roughly twice as good as is generally found among schizophrenics. Gerloff(10) as well as Malamud and Render(32) find motor and motor-speech disturbances favorable symptoms. Gyarfas(12) points out that disturbances of motility were definitely the most important of the process symptoms encountered in recovered cases. Numerous other authors, including Kretschmer(25), Lemke(28), Muller(36), Mauz(34), Raecke (38), Kirby (22), and Stalker(42), agree that the presence of manic-depressive features is prognostically favorable.

Atypical symptoms, especially those which are related to affective disturbances, are of favorable import for the outcome.

13. Process Symptoms

The "biological" school of Kretschmer and Kraepelin has defined schizophrenia as an endogenous disease manifesting itself in the form of process symptoms and determined largely by constitutional factors. This is the so-called "true schizophrenia" as differentiated from schizophrenic-like psychoses. Langfeldt(26) states, "The process symptom is regarded as a palpable sign of a malady of organic character, and this is often revealed at an early stage by a number of physical paresthesiæ and nervous irradiations which should therefore be followed as being prognostically significant. The organic character of the symptom also emerges from the fact that it cannot be deflected and is not comprehensible psychologically. The clearer and plainer the symptom is, the more process-organic it is. The process-character signifies nothing more than that the complaint *tends* in the direction of schizophrenic deterioration." Langfeldt characterizes process schizophrenia by the following criteria: (1) massive catatonic stuporous symptoms; (2) depersonalization; (3) derealization; (4) massive primary persecutory ideas; and (5) massive sensations of influence. Strauss (43) also emphasizes as particularly ominous the conscious realization of disintegration of the personality by the patient, accompanied by bizarre delusions and hallucinations. Kraepelin(24) considers stereotypy, fixed mannerisms and rhythmical movements as especially unfavorable symptoms. Raecke (38) believes command automatism, persistent negativism, and cerea flexibilitas to be of probably serious import. Gyarfas(12) found that primary delusions did not occur in recovered schizophrenics. Stalker(42) states that well-retained affective responses and absence of disharmony of affect are favorable, whereas negative symptoms and hallucinations are of no importance prognostically. Marked apathy and dissociation of affect are thought by most authors to be very unfavorable.

To sum up, the presence of true process symptoms, especially in the absence of the

element of confusion (as pointed out above) is of gravest consequence for the future course of the disease.

14. Sub-Types

From his review of the literature Blair(2) concludes that, of cases which remain progressively in one sub-type, the catatonics have the best, and paranoids the worst prognosis, with the hebephrenics in an intermediate position. However, as Dukor(8) indicates, the social prognosis for paranoids is not as unfavorable as that of hebephrenic and simple sub-types. Bleuler(3) pointed out that the symptoms tend to shift from one acute manifestation to another, thus making it difficult to evaluate the prognosis in early cases. Muller(36) considers hebephrenics, late catatonics and insidious paranoids more unfavorable than acute catatonics and amentia forms. Bumke(7) found that catatonics with insidious onset showed half as many favorable results as acute catatonics. Bleuler concurs in this observation, especially emphasizing the poor prognosis of catatonics with insidious onset. Stalker(42) observes that acute types of mental illness which cannot be fitted into any of the four standard sub-types are especially favorable. Since such cases would be characterized by atypical symptomatology, this observation concurs with the conclusions reached in the discussion of atypical symptoms.

Most statistical reports agree that the catatonic sub-type offers the best prognosis, and paranoids the worst, with the simple and hebephrenic sub-types in an intermediate position. Acute cases which are so atypical as not to allow classification under any of these four sub-types are especially favorable prognostically.

15. Course

It is obvious that a progressive course is ominous, whereas improvement while under observation in the hospital is indicative of a more favorable outcome. A fluctuating course, with apparent tendencies towards improvement is similarly more favorable than a course showing little change in any direction.

Summary

On the basis of a critical survey of the literature, the following conclusions are drawn concerning the significance of the various criteria of prognosis in schizophrenia:

The prognosis is most favorable when the duration of illness is short; the type of onset acute; exogenic precipitating factors, obvious; the element of confusion and the presence of atypical symptoms (especially manic-depressive symptoms), prominent in the early symptomatology; and when process symptoms are minimal or absent. Conversely, when these conditions are reversed, the prognosis is least favorable. This group of criteria is of the greatest import in the assessment of prognosis in schizophrenia.

Certain other factors seem to have some significance, although their relative prognostic importance cannot be clearly evaluated at the present time. Patients with a history of a previous episode of illness appear to have a better chance of remission; the more so, the longer the interval of time between attacks, the more complete the recovery during the preceding remission, and the greater the dissimilarity between the present and previous episodes. The incidence of manic-depressive psychoses in the hereditary background may be related to the development of atypical symptoms and thus favorably influence the outcome of the illness. From a prognostic point of view, asthenic body type is unfavorable, pyknic favorable; due to possible technical error, caution is required in classification of body-type. Extravert temperament and adequate pre-psychotic life-adjustment offer a more favorable outlook, in contrast to introversion and inadequacy of reaction to life situations. However, it should be noted that evaluation of these factors on the basis of information obtained from relatives and friends is only approximate. In general, the catatonic sub-type offers the best prognosis and paranoids the worst, with simple and hebephrenic sub-types in an intermediate position. Acute cases which are so atypical as not to allow classification under any of these four sub-types, are especially favorable prognostically. A progressive hospital course is ominous, whereas improvement or fluctuation is indicative of a more favorable outcome.

Male or female sex, education and abilities, and psycho-sexual history seem to have no prognostic significance. Likewise the factor of age at onset of illness does not contribute to the assessment of outcome, except that relatively late age offers an unfavorable prognosis.

BIBLIOGRAPHY

1. Barrett, A. M.: Heredity relations in schizophrenia. Proc. A. Research Nerve & Ment. Dis., **5**: 67, 1928.

2. Blair, D.: Prognosis in schizophrenia. J. Ment. Sc., **86**: 378, 1940.

3. Bleuler, E.: The physiogenic and psychogenic in schizophrenia. Am. J. Psychiat., **10**: 203, 1930.

4. Bond, E. D.: Underestimation of good results in mental diseases; facts in 1,024 cases. J. A. M. A., **85**: 503, 1925.

5. Bowman, K. M., and Raymond, A. F.: Physical findings in schizophrenia. Am. J. Psychiat., **8**: 901, 1929.

6. Braatoy, T.: The prognosis in schizophrenia, with some remarks regarding diagnosis and therapy. Acta Psychiat. et Neurol., **11**: 63, 1936.

7. Bumke, quoted by Dukor.

8. Dukor, B.: Die Prognose der Geisteskrankheiten. Schweiz. med. Wchnschr., **69**: 45, 1939.

9. Forel, O. L.: Le pronostic dans la pratique psychiatrique, son application au cas de schizophrénie. Schweiz. Arch. f. Neurol. u. Psychiat., **27**: 250, 1931.

10. Gerloff, W.: Über Verlauf und Prognose der Schizophrenie. Arch. f. Psychiat., **106**: 585, 1936.

11. Guttman, E., Mayer-Gross, W., and Slater, E. T. O.: Short distance prognosis of schizophrenia. J. Neurol. & Psychiat., **2**: 25, 1939.

12. Gyarfas, K.: Beiträge zur prognostischen Bedeutung der schizophrenen Prozesssymptome. Ztschr. f. d. ges. Neurol. u. Psychiat., **150**: 740, 1934.

13. Henderson, D. K., and Gillespie, R. D.: Textbook of Psychiatry. 4th ed. Oxford Univ. Press, London, 1936.

14. Hoch, A.: Constitutional factors in the dementia præcox group. Rev. Neurol. & Psychiat., **8**: 463, 1910.

15. Horwitz, W. A., and Kleiman, C.: A survey of cases of dementia præcox discharged from the Psychiatric Institute and Hospital. Psychiatric Quart., **10**: 72, 1936.

16. Hunt, R. C., and Appel, K. E.: Prognosis in the psychoses lying midway between schizophrenia and manic-depressive psychoses. Am. J. Psychiat., **93**: 313, 1936.

17. Hunt, R. C., Feldman, H., and Fiero, R. P.: Spontaneous remissions in dementia præcox. Psychiatric Quart., **12**: 414, 1938.

18. Jung, C. G.: The psychology of dementia præcox. Nerv. & Ment. Dis., Monograph Series 3, 1909.

19. Kahlbaum, K.: Zur Kasuistik der Katatonie. Monatschr. f. Psychiat. u. Neurol., **12**: 22, 1902.

20. Kant, O.: A comparative study of recovered and deteriorated schizophrenic patients. J. Nerv. and Ment. Dis., in press, 1941.

21. Kant, O.: The incidence of psychoses and other mental abnormalities in the families of recovered and deteriorated schizophrenic patients. (To be published.)

22. Kirby, G. H.: The catatonic syndrome and its relation to manic-depressive insanity. J. Nerv. & Ment. Dis., **40**: 694, 1913.

23. Kolle, 1928, quoted by Blair.

24. Kraepelin, E.: Dementia præcox and paraphrenia. E. & S. Livingston, Edinburgh, 1919.

25. Kretschmer, E.: Körperbau und Charakter. Springer, Berlin, 1922.

26. Langfeldt, G.: Prognosis in schizophrenia and factors influencing course of disease; katamnestic study, including individual re-examinations in 1936 with some considerations regarding diagnosis, pathogenesis and therapy. Acta Psychiat. et Neurol. Supp., **13**: 1, 1937.

27. Langfeldt, G.: Question of spontaneous remissions of schizophrenic psychoses with special consideration of duration of these remissions; what can be obtained with shock therapy of these conditions? Ztschr. f. d. ges. Neurol. u. Psychiat., **164**: 494, 1939.

28. Lemke, R.: Untersuchungen über die soziale Prognose der Schizophrenie unter besonderer Berücksichtigung des encephalographischen Befundes. Arch. f. Psychiat., **104**: 89, 1935.

29. Leonard, K.: Die defekt-schizophrenen Krankheitsbilder. Leipzig, 1936.

30. Lewis, A. J.: Prognosis in schizophrenia. Lancet, **1**: 339, 1935.

31. Lewis, N. D. C., and Blanchard, E.: Clinical findings in recovered cases of schizophrenia. Am. J. Psychiat., **2**: 481, 1931.

32. Malamud, W., and Render, N.: Course and prognosis in schizophrenia. Am. J. Psychiat., **95**: 1039, 1939.

33. Mapother, E.: Mental symptoms associated with head injury. Brit. Med. J., **2**: 1055, 1937.

34. Mauz, F.: Die Prognostik der endogenen Psychosen. Leipzig, 1930.

35. Meyer, E.: Zur prognostischen Bedeutung der katatonischen Erscheinung. München. med. Wchnschr., **50**: 1369, 1903.

36. Muller, M.: Die schizophrenen Erkrankungen. Fortschr. d. Neurol., Psychiat., **7**: 447, 1935.

37. Myerson, A.: Personal communication; 1940.

38. Raecke, J.: Zur Prognose der Katatonie. Arch. f. Psychiat., **47**: 1, 1910.

39. Rennie, T. A. C.: Follow-up study of 500 patients with schizophrenia admitted to hospital from 1913 to 1923. Arch. Neurol. & Psychiat., **42**: 877, 1939.

40. Rupp, C., and Fletcher, E. K.: Five to ten years follow-up study of 641 schizophrenic cases. Am. J. Psychiat., **96**: 877, 1940.

41. Schmidt, H.: Quoted by Blair.

42. Stalker, H.: Prognosis in schizophrenia based on follow-up study of 129 cases treated by ordinary methods. J. Ment. Sc., **85**: 1224, 1939.

43. Strauss, E. B.: Some principles underlying prognosis in schizophrenia. Proc. Roy. Soc. Med., Sect. Psychiatry, **24**: 27, 1931.

44. Strecker, E. A., and Willey, G. F.: Prognosis in schizophrenia. J. Ment. Sc., **73**: 9, 1927.

45. Sullivan, H. S.: Tentative criteria of malignancy in schizophrenia. Am. J. Psychiat., **74**: 759, 1928.

46. Taylor, J. A., and Von Salzen, C. F.: Prognosis in dementia præcox. Psychiatric Quart., **12**: 576, 1938.

47. Whitehead, D.: Prognosis in dementia præcox. Psychiatric Quart., **11**: 383, 1937.

48. Wooton, L. H., Armstrong, R. W., and Lilley, D.: An investigation into the after histories of discharged mental patients. J. Ment. Sc., **81**: 168, 1935.

49. Zilboorg, G.: Malignant psychoses related to childbirth. Am. J. Obst. & Gynec., **15**: 145, 1928.

INSULIN CONVULSIONS

A Method of Prevention[1]

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In his monograph on insulin treatment, Sakel(1) made the distinction between two types of insulin effect: *wet shock,* in which profuse perspiration was observed, and which was assumed to result in coma, and *dry shock,* in which perspiration was lacking, and which was supposed to result in convulsion. Both types were described as having their own therapeutic values, the balance being slightly in favor of the convulsion. Therefore, with the advent of metrazol, the application of convulsant doses of this drug during insulin shock appeared to be a welcome improvement of shock therapy.

Myoclonoid Vascular Collapse and Epileptoid Convulsion.—Any correlation between degree of perspiration and insulin convulsion has been disproved by Frostig *et al.*(2). It has been shown that perspiration may be absent in comatose as well as convulsive shocks, the percentage of shocks without perspiration for the comatose type being 11.2 per cent, and for the convulsive type 14.7 per cent. Moreover, emphasis has been placed on the fact that the clinical symptomatology of insulin convulsions (Frostig(2, 3)) is not identical with that of metrazol injections, or of the spontaneous convulsions of epilepsy. The differences are briefly summarized in Table 1.

Thus, the essential motor elements of the insulin convulsion are forceful, lightning-like jerks. These jerks are different from the myoclonias observed in encephalitis lethargica or in Lundberg's myoclonic epilepsy. They resemble, rather, the twitchings observed in myoclonus multiplex (Friedreich). To stress their specific clinical position, we have referred to them as "myoclonoid." Also, the second essential element of the insulin convulsion, the vascular collapse, does not occur in the epileptoid type of convulsion, nor does it precede the motor discharge of the seizure. For these reasons it has been concluded that this type of convulsion is probably based on a neuropathological mechanism different from that of the epileptoid convulsion, and has therefore been referred to as "myoclonoid vascular collapse."

Attention should be called to the fact that the myoclonoid vascular collapse is always

TABLE 1

Insulin Convulsion	Epileptoid Convulsion
a. Prodromal phase: uniform, only motor; lightning-like, forceful symmetrical jerks preceding the seizure from a few minutes to an hour.	a. Prodromal phase: plurimorph; motor, sensory, vegetative, preceding the convulsion from a few seconds to a minute.
b. Preceding the seizure or simultaneous with it; sudden, deep pallor of the face; thread-like, almost imperceptible pulse; collapse of peripheral vessels.	b. Accompanying, slight pallor. No collapse of peripheral vessels.
c. Seizure consists of: generalized myoclonoid twitchings, only rarely followed by tonic spasms.	c. Seizure consists of a tonic spasm which is followed by clonic twitchings.
d. No livid coloration of face after seizure.	d. Livid coloration of face after seizure is present.
e. No biting of tongue; no incontinence of urine.	e. Biting of tongue; incontinence of urine.

[1] From the divisions of psychiatry and medicine, University of California Medical School, San Francisco, California, and from the Camarillo State Hospital and Stockton State Hospital, of the State of California.

preceded by myoclonoid twitchings. It will be shown that not all myoclonoid twitchings are followed by a convulsive seizure. Thus the period between the appearance of the myoclonoid twitchings and the seizure proper presents the most convenient time for the application of any method which might prevent the occurrence of convulsions.

Myoclonoid vascular collapse is to be considered as the prevalent type of convulsion during insulin shock treatment. Epileptoid seizures may also be observed, though very rarely. According to our observations, myoclonoid vascular collapse occurs during the subcortico-diencephalic phase, while an epileptoid convulsion, though having some predilection for the midbrain phase, may occur at any time.

TABLE 2

	Shock days	No. of convulsions	Per cent
Frostig: Poland(2)	1,000	28	2.8
Frostig et al.: New York(4).	1,515	37	2.4
Van der Veer and Riese(5)..	?	?	2.8
Goldman(6)	3,115	128	4.1
Frostig: Poland (not published)	3,578	151	4.2

The frequency of convulsions, as noted by ourselves and some other observers, is shown in Table 2.

Except for Schulz(7), Heilbrunn and Sternlieb(8), Goldman(6), and M. Müller (12), most of the investigators either expressly state or tacitly admit that the convulsions have a beneficial effect on the outcome of the treatment. However, it may be seen from the paper of Malzberg(9) that the recovery rate in the New York state hospital system was the highest in the group of cases without convulsions: 16 per cent in a group of 645 cases without convulsions, and 11.2 per cent in 197 cases with 1 or 2 convulsions. The percentage of recoveries in those with an increasing number of convulsions (2-4, 4-6, etc.) decreased regularly except for the group in which 9-10 convulsions occurred. This latter group, however, consists of only 10 cases, and the figures for the recovery rate are, because of the small number, not too reliable. The figures of Malzberg supplied the first substantial clue for the assumption that the insulin convulsion may not be so beneficial as it had seemed from less extensive previous observations.

Method.—Thus, an attempt to prevent insulin convulsions appeared to be justified. The following methods were tried.

1. The oral administration of barbiturates (dilantin, nembutal, sodium amytal) preceding the insulin. We found that the average dose, even if administered in the morning on all treatment days, did not prevent convulsions, although it may have reduced their incidence. Moreover, the daily administration of barbiturates introduces an undesirable cumulative effect. This method was therefore abandoned.

2. Having established the fact that myoclonoid twitchings always precede a myoclonoid vascular collapse, it appeared to us that the most opportune time for the administration of preventive drugs would be the period between the occurrence of such twitchings and the seizure proper. Such a method, it was thought, might greatly reduce the number of necessary applications. At first small doses of glucose (4-8 gms., 25 per cent soln.) were administered intravenously. But this was fraught with a serious disadvantage. Although glucose injections prevented convulsions, interference with the proper progress of the shock was observed. The patient would remain for hours in the subcortico-diencephalic phase. After some time the myoclonoid twitchings would reappear, and additional injections of small doses of glucose would become necessary. On such days the patient would not be able to reach even the midbrain phase, but instead remained during the entire treatment on the verge of a convulsive attack. Nevertheless this method enabled us to reduce the number of convulsions to 1.7 per cent.

3. Real progress was made when one of us (Dr. Bennett) suggested the intravenous injection of sodium amytal in the myoclonoid prodromal phase. The first trials established the fact that, after an intravenous injection of 1½-2 grains of this drug, the myoclonoid twitchings would disappear entirely or change into the clonic type. In contrast to the effect of small doses of glucose, the subcortico-diencephalic phase was shortened and progression into the midbrain phase was even more smoothly accomplished than on non-myoclonoid days. The intended depth of shock could be reached without any difficulty. It had been known that on any treatment day in which myoclonoid twitchings were observed there was some difficulty in reaching the midbrain phase. Spontaneous awakenings and prolonged hyperkinetic episodes would hamper the progress of the shock. Thus the injection of sodium amytal not only

prevented the convulsions, but also facilitated the progression of shock to its desired depth.

Results.—Forty-two patients, in Stockton State Hospital, were thus treated from February to December, 1940, with the following results as regards convulsions:

TABLE 3

	No. of days	Per cent of treatment days	Per cent of shock days	Per cent of myoclonoid days
Treatment days ..	2,025	...	...	...
Shock days	1,445	71.4	...	...
Myoclonoid days .	665	32.8	46.0	...
No. of sodium amytal days (1¼ gr. per dose)	453	22.4	31.3	68.1
No. of convulsions.	3	0.1	0.2	0.5

On 88 shock days a second injection of sodium amytal (1⅞ grain) was necessary due to the reappearance of myoclonoid twitchings; the relation to insulin days being 4.3 per cent, to shock days 6.1 per cent, to myoclonoid days 13.2 per cent, and to sodium amytal days 19.4 per cent. Of the three convulsions which were not prevented, two showed the symptoms of myoclonoid vascular collapse, while one occurred without any prodrome and was of the epileptoid type. The two convulsions of the myoclonoid vascular type were not prevented for purely technical reasons. In one case there were difficulties because of small veins, the convulsion occurring while attempts were being made to inject the sodium amytal. In the other case the physician was busy injecting another patient.

Two more convulsions occurred in cases in which the treatment was discontinued for somatic reasons. These cases, if included, would increase the number of shock days to 1654 and change the general correlation between the number of shocks and the number of convulsions to 0.3 per cent. The therapeutic outcome of the treatment for the group of completed treatments is presented in Table 4.

Discussion.—In a group of 42 patients who were treated with insulin at Stockton State Hospital only 3 insulin convulsions occurred, thus reducing their incidence from 2.4 per cent of all shock days, the lowest previous figure, to 0.2 per cent of the shock days. Only one of these convulsions was of the epileptoid type. It might therefore be concluded that all insulin convulsions of the myoclonoid vascular type can be prevented by the sodium amytal method of Bennett. It is also evident that the epileptoid type of convulsion is of rare occurrence in insulin shock therapy. There are some reasons for believing that such convulsions occur only in patients in which there is an epileptic heredity, or congenital or postnatal brain damage. It is to be assumed that the frequency of occurrence of epileptoid convulsions depends on the number of treated cases with such organic defects. The extremely low incidence at Stockton State Hospital is explained by the fact that for experimental reasons, all cases in which either epilepsy or brain damage could be elicited, were excluded from treatment. The incidence of epileptoid convulsions was higher in Camarillo State Hospital where such a policy had not been adopted. This problem will be the subject of a special study.

The frequency of myoclonoid twitchings is much higher than that of convulsions, the ratio being 19:1. Thus, in order to prevent

TABLE 4

	Improvement					
Known duration	++++	+++	++	+	0	..
0-11 months	19	2	4	2	1	28
12-23 months	5	0	1	1	0	7
24 months and over.....	3	1	1	0	1	6
Duration undetermined	0	1	0	0	0	1
	27	4	6	3	2	42
	64.3%	9.5%	14.3%	7.1%	4.8%	..
Known duration	++++	+++	++	+	0	..
0-23 months	24	2	5	3	1	35
	68.6%	5.7%	14.3%	8.6%	2.9%	..

Legend. ++++—Recovery. +++—Social remission. ++—Essential improvement. +—Partial improvement. 0—No improvement.

the expected 46 convulsions or more, sodium amytal had to be injected on 453 days and even given a second time on 88 of these days. This is certainly a weakness of the method, but as yet there is no way to determine when myoclonoid twitchings will or will not be followed by convulsions. Further study may show that there is a clinical difference between the myoclonoid pre-convulsive phase and other myoclonoid twitchings. Some clues point toward the possibility of such a distinction, but they are as yet too vague to permit a satisfactory differentiation.

The group of cases treated at Stockton State Hospital can be considered to be practically free from convulsions. Therefore, a comparative analysis of the results may perhaps show whether or not such a prevention is detrimental to the efficacy of the treatment. The analysis will embrace the cases treated by one of us (Frostig) in the Psychiatric Institute, Zofiowka, Poland, the cases treated at Camarillo State Hospital, and those treated at Stockton State Hospital. Such a comparison is especially justified because all three groups were treated according to the same standard method.

TABLE 5

NUMBER OF CASES AND THE COMPARATIVE VALUES OF CONVULSIONS

	Cases	Per cent seizures
1. Zofiowka (no prevention of convulsion)	139	2.8
2. Camarillo (trial and error period)	71	1.7
3. Stockton (systematic prevention)	42	0.2

TABLE 6

COMPARISON OF RESULTS

	Any degree of improvement, per cent	Good improvement, per cent	Recoveries, per cent
1. Zofiowka	90.2	86.3	76.9
2. Camarillo	96.0	96.3	64.1
3. Stockton	97.1	88.6	68.6

In order to exclude the chance factor of improvement in the group of cases with psychosis of duration over 2 years, only the cases of less than 2 years' duration will be compared.

The higher percentage of recoveries in Zofiowka is explained by the fact that there was no distinction made between social remissions and recoveries, the social remissions being counted as recoveries.

A comparison of the figures will reveal that the trend of improvement is not changed by the presence or absence of convulsions. It may therefore be emphasized that convulsions do not contribute to the therapeutic effectiveness of insulin treatment and, being an uncontrollable and sometimes dangerous complication, should be prevented.

Summary and Conclusions.—1. The frequency of occurrence of the insulin convulsion in the published material, if not prevented, is established as being from 2.4 per cent at the lowest to 4.1 per cent at the highest level, relative to the number of shock days.

2. Convulsions in insulin shock treatment are divided into two groups: The myoclonoid vascular collapse and the epileptoid convulsion. It is contended that the epileptoid convulsion is infrequent and depends either upon an epileptic disposition, or upon previous brain injury.

3. The myoclonoid vascular collapse is preceded by a myoclonoid pre-convulsive phase; the relationship of the occurrence of this phase to the occurrence of the convulsion proper being about 19:1. In order to prevent convulsions of the myoclonoid vascular type the injection of $1\frac{7}{8}$ grain sodium amytal during the myoclonoid prodrome is recommended. Such an injection must be repeated in case the myoclonoid twitchings reappear. In 19.4 per cent of all sodium amytal days a second injection was required.

4. By using this method, in 42 cases with a total of 2025 insulin days and 1445 shock days, the incidence of convulsions was reduced to 3 instead of the expected 46, the percentage being 0.2 per cent instead of 2.4 per cent. A comparison of the results of groups treated with the same method, except for the prevention of convulsions, has shown that the absence of convulsions had no effect on the trend of improvement.

5. No complications arose from the use of sodium amytal. On the contrary, a smoother progress of the shock was obtained.

We are indebted to A. J. Rosanoff, M. D., Director of Institutions; Thomas A. Hagerty, M. D.,

Medical Director, Camarillo State Hospital; and Margaret H. Smyth, M. D., Medical Director, Stockton State Hospital, for facilitating the studies, and for permission to use the material for publication. Sodium amytal for research was obtained through the courtesy of E. Lilly Co.

BIBLIOGRAPHY

1. Sakel, Manfred: Pharmacological shock treatment of schizophrenia. Nervous and Mental Diseases Monograph (New York City, 1939).

2. Frostig, J., Kister, J., Manasson, A., and Matecki, W.: Experiences with the insulin treatment of schizophrenia. Rocz. Psychiatr., **28** (1936). In Polish.

3. Frostig, Jacob P.: Clinical observations in the insulin treatment of schizophrenia. Am. J. Psychiat., **96**: 1167-1190, March, 1940.

4. Frostig, Jacob P., Cline, W. B., Rossman, T. M., and Schwörer, O.: The protracted shock; its cause and prevention (in publication).

5. Van der Veer, A. H., and Riese, H. H.: Treatment of schizophrenia with insulin-shock. Am. J. Psychiat., **95**: 2, Sept., 1938.

6. Goldman, Douglas: Epileptiform seizures in insulin shock therapy; a clinical study. Jour. Nerv. Dis., **90**: 765-773, 1939.

7. Schulz, H. E.: Zur Frage des epileptischen Anfalls im Shock. Psychiatr. neurl. Wchschft., 1938.

8. Heilbrunn, Gert, and Sternlieb, Ruth. Insulin therapy of schizophrenia in the Elgin State Hospital. Am. J. Psychiat., **96**: 1203-13, March, 1940.

9. Malzberg, Benjamin: Outcome of insulin treatment of one thousand patients with dementia præcox. Psychiat. Quart., **12**: 528-553, July, 1938.

10. Frostig, J. P.: Experiences with the insulin therapy in schizophrenia with special reference to clinical problems. Am. J. Psychiat., **94**: 220-226, May, 1938.

11. Frostig, Jacob P.: Technique of insulin-shock therapy. Report of the Department of Institutions, State of California, June 30, 1940, Sacramento, California.

12. Müller, M. v.: Die Insulin- und Cardiazolbehandlung in der Psychiatrie. Fortschrt. der Neurol., Psychiatr., und ihre Grenzgebiete, **11**: nos. 8, 9.

ELECTROENCEPHALOGRAPHY IN SCHIZOPHRENIA [1]

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The term schizophrenia covers an extremely large and heterogeneous group of mental disorders. Its application varies from time to time, from clinic to clinic, from psychiatrist to psychiatrist. In the annual report for 1939 from Burghölzli, where schizophrenia received its baptism, of 679 new admissions 215 patients were diagnosed as schizophrenic, while 9 were diagnosed as manic-depressive cases.

It is well, therefore, to realize the fact that the term schizophrenia can only be looked upon as a first approximation to a diagnosis. It emphasizes the disorganization of the system of forces which we call the personality, and suggests that the type of disorganization is ominous.

If one leaves aside those mental disorders which are adequately explained by the presence of structural, toxic or nutritional disturbance of the central nervous system and other clean-cut and familiar patterns such as the affective types, one is left with this very extensive and heterogeneous group of disorders which are liable to be called schizophrenic. While in some of these cases there are indications of underlying physiological disturbance, in the great majority no unequivocal evidence of significant physiological disturbance is found. On the other hand, in a large number of cases the condition of the patient seems to be closely related to his difficulty in meeting familiar tests or demands, *e.g.*, management of the sexual instinct, emancipation from childhood attachments, establishment of independence, maintenance of a sound objective level of thought; in these cases constitutional endowment, early conditioning, actual environmental influences seem to be of importance.

There is so far no sound basis for bringing all these patients into one category. No impersonal process common to all types of schizophrenic disorder has been demonstrated by physiological, endocrinological, bacteriological or histopathological studies.

At the Boston Psychopathic Hospital for over a decade a systematic investigation of schizophrenic conditions has been carried on. During the past two years the techique of electroencephalography has been utilized in the hope that even in the present stage of its development it might help to answer some of the questions connected with the schizophrenic problem. Thus the technique might on a purely empirical basis enable us to differentiate special sub-groups for further intensive scrutiny. The technique might enable us to establish certain common characteristics of the schizophrenic group as a whole. It might supply evidence of some recognized type of disturbance of function of the central nervous system.

The preliminary stages of our electroencephalographic investigations have been devoted to a rather extensive survey of an unselected group of schizophrenic cases and to a comparison of these findings with the findings in normal individuals, cases of organic disturbance of the central nervous system and cases of affective disorders.

In order to have a common basis for comparison of brain wave patterns and normal controls, it is essential to have a uniform method of classifying EEG. tracings. As our present limited understanding of the nature and origin of brain potentials does not permit us to translate them into neurophysiological terms, we have chosen a method of classification based on the normality and abnormality of the EEG. tracings as determined by their occurrence in normal controls and in organic disorders of the C.N.S. We have divided the records into five groups (Fig. 1), a method suggested to us by Davis(1). Groups 1 and 2 include records which are commonly found in normal individuals. The third group of ques-

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Va., May 5-9, 1941.

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tionable normal records [2] comprises borderline cases which bridge the gap between normal and abnormal records. Groups 4 and 5 are abnormal records. The basis for judging their abnormality is the fact that these patterns are found in known organic diseases of the C.N.S. As a group, the number 4 classification is less abnormal. The important characteristics of records in the five groups are as follows (Fig. 1):

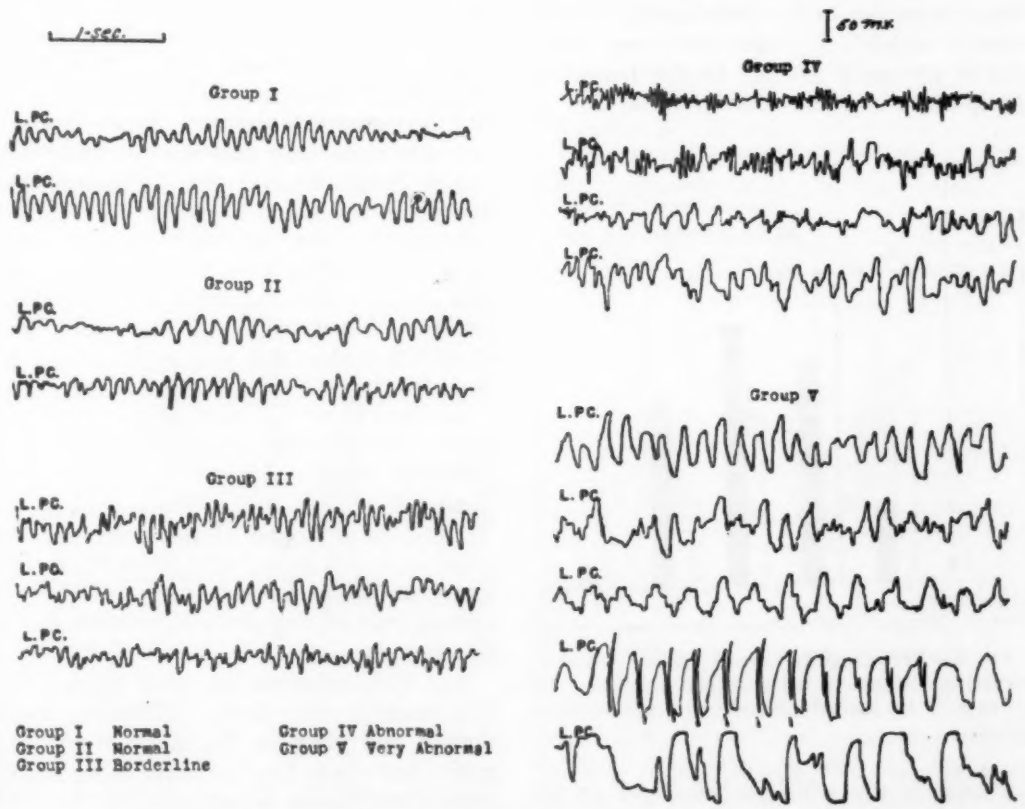

FIG. 1.—Classification of records on the basis of normality or abnormality as judged by their occurrence in normal controls and in organic brain disease.

Group 1.—Uniform normal frequency pattern (8 to 12 cycles per second) made up of sine cycles undistorted by cycles outside the normal range.

Group 2.—Similar to group 1 except that the sine contours of the normal frequency cycles are slightly distorted by the presence of superimposed low voltage rapid activity, or the presence of occasional random slow cycles or both.

Group 3.—This group is difficult to describe as it contains a great variety of patterns. In general, they include those records in which there is an absence of any organized frequency pattern. The cycles are often of low amplitude. They are either questionable normal or questionable abnormal tracings. Our present knowledge and interpretation prevent us from evaluating them accurately. It is a borderline group which bridges the gap between normal and abnormal records.

Group 4.—Many of these records contain a significant quantity of rapid activity. The voltage of these rapid cycles is twenty-five microvolts or more and may or may not be superimposed upon slow cycles. The records which contain many random or infrequent short runs of abnormally slow cycles are placed in this group. Records of adults in which the pattern breaks down showing a significant increase in the amplitude of the cycles and a slowing of the frequency as a result of two minutes of hyperventilation are likewise included in this group.

Group 5.—These records contain well organized rapid activity of high voltage, fifty microvolts or more, or a predominant abnormally slow frequency pattern of high voltage usually seventy-five microvolts or more, or a combination of rapid and slow activity, the rapid occurring in either isolated bursts or superimposed upon slow activity.

[2] A term used by Gibbs and Gibbs for similar patterns in their *Atlas on Electroencephalography.*

By this method of classification, 500 schizophrenic records are compared with 215 normal control records[3] (Fig. 2). A glance at Fig. 2 will suffice to show that there is a significant difference in the distribution of the records of schizophrenics and normal controls. Though 40 per cent of the records of schizophrenics fall within the normal range, this is significantly less than the 70 per cent of the normal control records which fall within the same range, that is groups 1 and 2. In the borderline group 3, or questionable records, fall 34

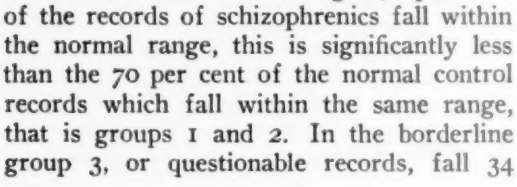

FIG. 2.—Percentage of normal (groups 1 and 2) borderline (group 3) and abnormal (groups 4 and 5) records in normal controls and schizophrenic patients.

per cent of the schizophrenics and 22 per cent of the normal control records. In the abnormal 4 group are 25 per cent of the schizophrenics and only 7 per cent of the normal control records. In the extremely abnormal group 5, are 3 per cent of the schizophrenic records and none from the normal controls. This approach to the problem reveals a significant difference in the EEGs. of the schizophrenics and the normal controls each considered as a total group.

For the further study of the general schizophrenic group it seemed desirable to survey our findings in their relation to somewhat more precise clinical analysis. The division of the great group of schizophrenia has been carried out by different authors in different ways and the clinical sub-groups of dementia præcox as outlined by Kraepelin in his eighth edition are very numerous. For the purpose of correlation of EEG. findings it seemed better to utilize as a first provisional grouping a simpler formulation:

(1) Simple deterioration (dementia simplex). Cases of primary deterioration where the patient is anergic, indifferent, tends to live a parasitic existence. Forty-seven of our 500 cases were classified in this group.

(2) Schizophrenia of catatonic-hebephrenic type. Cases of reduced or variable accessibility and productivity with more emotional tension than in the above cases, and frequent breaking through of crude tendencies. Ninety-eight of our cases were classified under this group, in which are included cases with an affective admixture ("schizo-affective"), also many acute psychoses of uncertain prognosis with considerable emotional tension (schizophrenic "turmoil").

(3) Schizophrenia of paranoid type, *i.e.*, cases in which a distorted attitude or delusions are the prominent feature of the psychosis. 218 of our cases were classified in this category.

(4) Schizophrenia of other types. This is a heterogeneous group, difficult to differentiate and place in the above three categories but whose kinship to the other schizophrenic conditions is suggested by the clinical picture and poor prognosis. One hundred thirty-seven of our 500 cases fall into this group.

In Fig. 3 the EEG. tracings of the 500 schizophrenic patients have been broken down into the above four groups and their records classified according to the degree of normality or abnormality. The catatonic-hebephrenic cases show a greater proportion of abnormal records than the other groups. From our clinical experience, this finding is not surprising for a disturbance of the more basic and cruder elements of the personality stands out much more in the catatonic-hebephrenic group. Except for the catatonic-hebephrenic cases in which there is a marked increase in the abnormal group 4 EEG.

[3] The normal controls include nurses, medical and college students, doctors, friends and relatives of the same, the relative number of each group being in the order named.

records, the differences in degree of abnormality between the various schizophrenic sub-groups are not extremely striking.

We have compared the EEG. tracings of schizophrenia with manic-depressive and epileptic disorders (Fig. 4). The tracings of the manic-depressive patients are similarly distributed among the five groups (outlined above) with the exception that there are proportionately fewer manics in the borderline group and more in the abnormal group 4. Davis and Davis(2) found a similar group of normal and abnormal records in 100 patients from mental hospitals. As one might expect, the records of the epileptic patients show fewer normal records

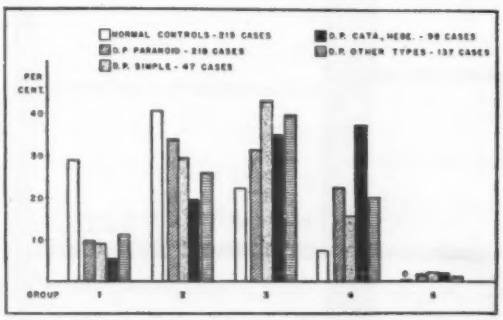

FIG. 3.—Percentage of normal (groups 1 and 2) borderline (group 3) and abnormal (groups 4 and 5) records from normal controls, and from different types of schizophrenia.

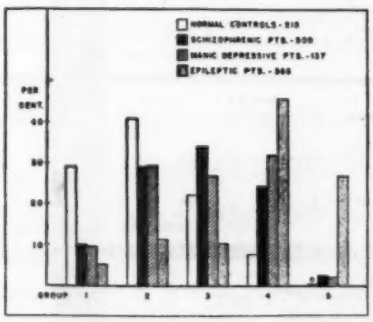

FIG. 4.—Percentage of normal (groups 1 and 2, borderline (group 3), and abnormal records (groups 4 and 5) from normal controls, schizophrenics, manic depressive and epileptic patients.

normal, a pattern seldom seen in schizophrenia but very often in the organic conditions. Sample 4 is characterized by the low amplitude of the cycles showing no uniform frequency pattern and which usually on amplification will show an inconsistency in the frequency and amplitude of the cycles. This type of record is common among the psychoses. Sample 5 illustrates a mild degree of irregularity in the frequency pattern from the frontal and precentral leads with a fairly uniform normal frequency pattern from the occipital leads. In sample 6 the contour of the normal frequency cycles from the frontal and precentral leads has a mildly choppy appearance due to the presence of rapid spike cycles which may or may not be due to muscle artefact. Sample 7 is similar to sample 5 except that the degree of disorganization of the frequency pattern is more marked and there is in addition a lack of any consistent normal pattern from the occipital leads. Samples 8 and 9 are similar in the irregular distribution of rapid activity from the frontal and precentral regions. These two samples differ, however, in that sample 8 has uniform normal rhythm from the occiput while it is irregular in sample 9. In sample 10 the characteristic feature is the dominant slow 5 per second frequency pattern, the contour of these 5 per second cycles being uneven because of superimposed irregular low voltage rapid activity. Sample 11 illustrates a very striking and characteristic pattern with a well organized rapid rhythm from the frontal region and a normal pattern from the precentral and

and a far great percentage of abnormal records than in the other two clinical disorders.

Do abnormal records of schizophrenic patients have any common feature which permits them to be of diagnostic aid? In Fig. 5 are illustrated 15 different samples of schizophrenic EEG. tracings including normal, questionable and abnormal types to illustrate the great variation of records in this mental disorder. This is not unexpected in view of the variety of clinical pictures seen in schizophrenia. Jasper, Fitzgerald and Solomon(3) reached the same conclusion from their study of the EEG. tracings in schizophrenic patients. A brief description of these 15 records is as follows: Samples 1 and 2 are the common patterns found in normal individuals. Sample 3 has a slow frequency between 7 and 8 cycles per second just below the lower limits of

occipital leads. In sample 12 rapid activity, although most prominent from the frontal regions, is also present from the precentral regions with traces from the occipital leads. In sample 13 the characteristic feature is a rapid frequency pattern in the occipital region alone. Sample 14 has a 5 to 6 cycle per second frequency but in addition there is superimposed upon these slow cycles a more uniform rapid rhythm. Sample 15 shows many random and paired abnormally slow cycles interrupting an otherwise normal rhythm.

A study of these 15 samples will show that we need not expect to diagnose schizophrenia on the basis of an EEG. tracing. If there is anything approaching consistency in the records of schizophrenia, it is the predominance of rapid activity. Gibbs(4) was impressed by this in a study of EEGs. in schizophrenia. The frequency distribution as well as the duration of the rapid activity varies considerably in different records. Gibbs felt from the study of schizophrenic records with the Grass analyzer that these rapid frequencies tend to fall in certain frequency ranges. Rapid frequencies are by no means limited to this group of neuropsychiatric disorders. Rapid frequency patterns, in general including frequencies of 20 to 35 cycles per second, are even more common in the manic-depressive cases than in schizophrenia. In addition, rapid activity is not uncommon in the EEGs. of general paretics.

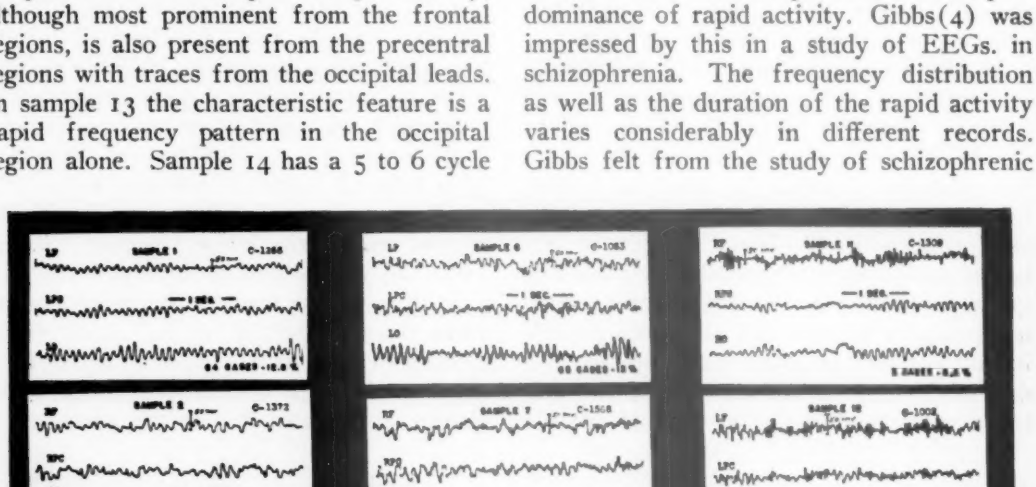

FIG. 5.—Fifteen different types of EEG. tracings obtained from 500 schizophrenic patients. The records from the total group were divided among these 15 types showing the general distribution on the basis of the similarity to these types. It will be noted that no one pattern is outstanding as no pattern includes more than 13 per cent of the total. This figure demonstrates the great variety of patterns encountered in schizophrenia.

Actually most of the samples illustrated in Fig. 5 can be duplicated in other neuropsychiatric disorders. Fig. 6 shows a series of records from the precentral area (similar to that illustrated in sample 12) obtained from a variety of neuropsychiatric conditions. A figure similar to Fig. 6 could be duplicated with other samples shown in Fig. 5. Lemere(5) was impressed by the paucity of alpha wave activity. This quality alone was found in only a very small percentage of the records of our patients. Some workers in the field of electroencephalography have been interested in the relation of schizophrenia to epilepsy on the basis of the EEG. tracings. Davis and Davis(2) found similarities in the brain potential patterns of schizophrenics and epileptics in only occasional instances. Gibbs, Gibbs, and Lennox(6) from their study of cortical dysrhythmia in schizophrenic and epileptic disorder believe that there is a positive relationship between these two clinical groups as the EEG. records give evidence of similar activity. Jasper, Fitzpatrick and Solomon(3) studying the brain potentials of 82 cases diagnosed as schizophrenia found EEG. evidence of epileptiform disturbances in 23 per cent of the 82 cases. They concluded that the EEG. tracings of schizophrenics and epileptics tend to fall in opposite groups. The more common feature of the epileptic record is the predominance of slow activity even though the frequency and amplitude of slow activity and its distribution varies tremendously in different epileptic records. In looking over the 15 samples illustrated in Fig. 5, one is impressed by the absence of slow activity. Slow activity of any significant quantity is found only in samples 14 and 15, and these were infrequently encountered. We fail to see any significant relationship between schizophrenia and epilepsy on the basis of the EEG. tracings.

We have carefully reviewed the clinical histories of 150 of the 500 schizophrenic patients to determine: (1) if EEG. tracings of similar character have anything in common with the clinical histories; and (2) if a given group of cases which show certain similar trends in the histories reveal any similarity in the character of the EEG. tracings. Our preliminary studies to date have shown no consistency in regard to the two points mentioned above. If one takes from these 150 cases EEG. patterns which are similar in appearance (that is similar to any one of the samples shown in Fig. 5), the corresponding histories of these patients will not be significantly alike. On the other hand, if one takes from the 150 cases clinical histories which have certain basic similarities the EEG. tracing of any one group

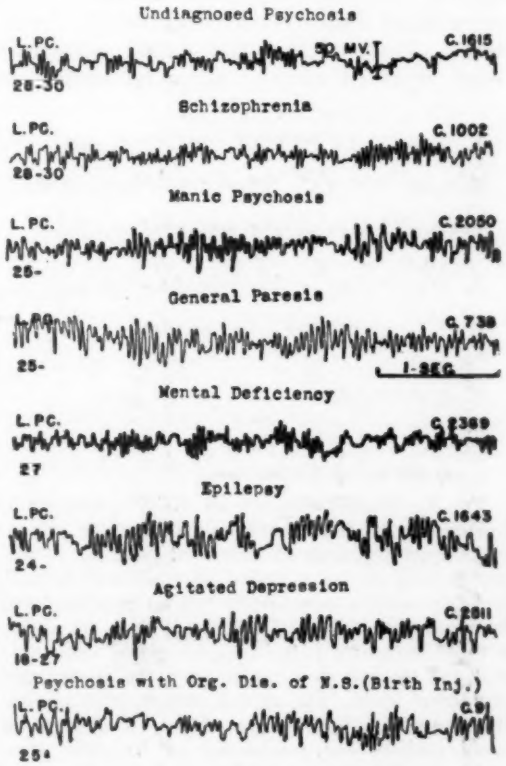

FIG. 6.—Similar types of brain potential patterns with a predominant rapid frequency rhythm from a variety of neuro-psychiatric disorders.

will show no common identity. For example, we have collected a group of histories in which paranoid ideas are the predominant element and have subdivided this group. We have isolated 22 cases in which "wishfulfilling" ideas appeared to be the predominant paranoid content. There is no similarity in the EEG. tracings of such groups. We have also collected 40 cases in which the common character of the paranoid trend was a projection to the outside world based on feelings of guilt. The EEG. tracings of this group showed no consistency

of pattern. A group of 22 patients in whom the psychoses were initiated by an acute emotional upheaval or turmoil, showed nothing consistent in the EEG. pattern except that in records taken at the time of their turmoil rapid activity was quite likely to be an outstanding characteristic.

In this preliminary study, our primary aim was to obtain records on a large number of different schizophrenic patients. Consequently we have obtained few follow-up records on the cases showing abnormal patterns. Most of the patients on whom we have repeated records show no change in the EEG. patterns. A few have shown a definite change which is usually associated with a change in the clinical picture. Fig. 7 illustrates this point. The patient, a 21 year old girl, was admitted because of increasing apprehension and suspicion with delusions and hallucinations going back a few weeks before admission. On the day of the first EEG. tracing (Feb. 7) the patient had a dazed and perplexed expression and was fearful of routine events taking place about her. The record obtained on this day (Fig. 7, Feb. 7) shows well formed rapid frequency pattern from the frontal and precentral leads most of which is superimposed upon random slow and normal frequency cycles. The patient was then transferred to another institution. From here, she was sent home on visit improved. While home on visit she was brought in for a second EEG. tracing on April 7, 2 months following the first (see Fig. 7). It will be noted that the rapid activity has disappeared and there remains only the irregular frequency pattern of random slow and normal cycles with some superimposed low voltage rapid activity. With repeated tracings we may expect to find changes in the character of the pattern in a certain percentage of schizophrenics. The pattern illustrated in Fig. 7 is frequently encountered in the turmoil (schizo-affective) types but is also common in manic-depressive conditions, agitated depressions of middle age and in neurosyphilis.

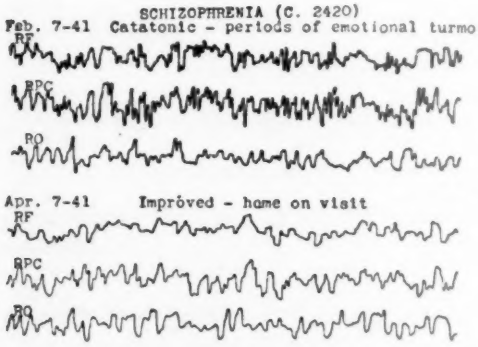

FIG. 7.—Modification of an EEG. pattern following clinical improvement in a catatonic schizophrenic with periods of emotional turmoil. February 7, 1941 during a period of emotional turmoil, and two months later, April 7, 1941 improved and home on visit. The first tracing (Feb. 7-41) shows a rapid frequency pattern superimposed upon normal and random slow cycles from the frontal and precentral leads. The second pattern after clinical improvement (April 7-41) shows an absence of rapid activity but persistence of irregular slow and normal frequency cycle with some traces of low voltage rapid activity.

With the psychosis an expression of the dynamic forces of the total personality, including those of both biological and psychological origin, and the EEG. an expression of the basic biological forces, a refined correlation between brain waves and schizophrenic development is not to be expected nor do we find this in our studies. Our studies show that the EEG. does not aid in establishing schizophrenia as an entity; on the contrary, the great variety of patterns encountered (Fig. 5) would favor the clinical impression that we are dealing with a heterogeneous group of disorders. Not only does the EEG. suggest this but the fact that many of the patterns found in this group occur also in other neuropsychiatric disorders, agrees with the clinical observation that there is no sharp line between schizophrenia and some other neuropsychiatric conditions. As one finds similarities in the personality pattern of schizophrenia and that of other psychiatric conditions so do we also find similarities in a certain percentage of EEG. patterns in schizophrenia and those found in other conditions. The special technique has shown itself to be of use in establishing the presence of a demonstrable disorder of function of the C.N.S. in at least 30 per cent of our cases. As our knowledge of the neurophysiological significance of the variety of abnormal patterns found in schizo-

phrenia becomes more precise, we may look forward to the EEG. as an aid in segregating a certain number of these patients from the total group. In patients showing abnormal EEG. tracings we have a guide which should direct us along further lines of investigation. Also, the more able we are to evaluate the biological factors in any given case, the more precise we can be in determining which elements in the psychosis are of personal and which are of impersonal origin. It is not too much to hope that further investigation will contribute to problems of prevention and of therapy.

Summary and Conclusion

1. The EEG. tracings from 500 schizophrenic patients are compared with the records from 215 normal controls. A significantly greater percentage of borderline and abnormal records was found in the schizophrenic patients.

2. A greater percentage of the abnormal records in the schizophrenic patients was found in the catatonic-hebephrenic group.

3. There is nothing consistent or diagnostic in the character of the EEG. tracings of schizophrenic patients, a great variety of records being obtained. Rapid activity is common but is not of diagnostic significance because similar activity is found in other neuropsychiatric disorders, particularly in the manic-depressives, agitated depressions of middle age and in neurosyphilitics.

4. Our studies show no significant relationship between schizophrenia and epilepsy on the basis of the EEG. patterns.

5. With the psychoses an expression of the dynamic forces of the total personality including those of both biological and psychological origin, we feel that the EEG. will prove to be a valuable measure of the basic biological forces playing a part in the schizophrenic disorders.

BIBLIOGRAPHY

1. Davis, Pauline A.: Technique and evaluation of the electroencephalogram. J. Neurophysiol., **4**: 92, 1941.

2. Davis, Pauline A., and Davis, M. A.: The electroencephalograms of psychotic patients. Am. J. Psychiat., **95**: 1007-1025, 1938-39.

3. Jasper, H. H., Fitzpatrick, C. P., Solomon, P.: Analogies and opposites in schizophrenia and epilepsy. Am. J. Psychiat., **98**: 835-851, 1938-39.

4. Gibbs, F. A.: Cortical frequency spectra of schizophrenic epileptic and normal individuals. Am. Neurol. Assoc., p. 141, 1939.

5. Lemere, F.: Electroencephalography. Psychiatric Quart., **13**: 5-15.

6. Gibbs, P. A., Gibbs, M. A., and Lennox, W. G.: The likeness of the cortical dysrhythmias of schizophrenia and psychomotor epilepsy. Am. J. Psychiat., **95**: 255-269, 1938-39.

FOLLOW-UP RESULTS IN INSULIN SHOCK THERAPY AFTER ONE TO THREE YEARS[1]

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For reasons given in former articles(1) and fairly obvious without explanation, a comparison of insulin-treated and control cases is made inside of the Pennsylvania Hospital, where prognostic studies in schizophrenia have received considerable attention in the past.

In 1927 Strecker and Willey(2) found 20 per cent of 186 consecutive schizophrenic cases recovered or much improved after five years. In 1937 Bond and Braceland(3), taking the schizophrenic cases from 710 consecutive admissions, found that 10 per cent of 116 cases were recovered five years after admission, but only 3 per cent were recovered on discharge. If to these cases were added others in which schizophrenic symptoms appeared but were not dominant, the recovery rate went up to 20 per cent. In 1939 Flumerfelt in 100 consecutive schizophrenic cases found 11 per cent recovered or much improved on discharge, and 18 per cent after five years.

In 1940 Farr turned back to 100 similar cases which were admitted in 1920, and found 13 per cent recovered on discharge and 18 per cent recovered five years after admission.

In all samples, then, the recovery—much improved rate on schizophrenic cases at the Pennsylvania Hospital has seemed to run consistently between 10 per cent and 20 per cent at the end of five years after admission. The rate on discharge has always been lower, so that if we look for the immediate effect of the hospital treatment we find our average below 10 per cent.

In the above groups, which are used as controls for insulin treated cases, we know well enough the errors which may be included in diagnosis and in follow-up and we intend to study prognosis again in the coming year.

One of the control cases has been followed for 14 years and now is under direct observation. Five years after admission she was reported by the family to be independent, confident, living alone, very generous. She was placed in our much improved group. Soon after she lost initiative and confidence, had no strength to do anything, felt sure that she was occasionally possessed by a devil, noticed a lack of ordinary emotions. She cannot read, believes that her eyes are failing and has noticed double vision.

In 1940 one of us (E. D. B.) reported upon 125 insulin treated cases and their follow-up. This year in a review of 154 insulin treated cases of schizophrenia such a striking difference in remission rate appears as to warrant division into two groups for separate consideration and comparison. This is not an arbitrary or artificial division. In those 82 cases treated from 1936 to 1938, designated group A, the application of shock treatment was tentative, comparatively mild and in the hands of different physicians. The principle was to keep the insulin dose as low as possible and still get hypoglycæmic stupor. When the stupor dose was reached a reduction was made on subsequent days if stupor level could be maintained. Convulsions were considered to be a signal of over dosage. On the other hand, 72 cases treated during 1939 and 1940, group B, were in charge of one full time physician. Contrary to the above principle the stupor dose was not considered the optimum; deeper and longer stupor was achieved by increasing the dosage. Convulsions were not considered contraindications to increasing the amount of insulin.

If we compare the results of early (A) and late (B) treatments for two years each, we have the contrast shown in Table I.

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Va., May 5-9, 1941.

Aided by a grant from the John and Mary R. Markle Foundation.

The results of insulin-shock treatment in 154 cases, which we present, are not important statistically when compared to those of the New York state hospital service. They have a value in comparison with our own control cases, and they point out some of the complications of follow-up work. (Table 11.)

In the four year cases we deal with such a small number (23) that we cannot put much reliance on the percentage of recovery. Moreover, 10 out of these 23 cases had been psychotic for 4 years or more before treatment, and the treatment was of the weaker (A) variety.

diagnoses or types. These are given for the two kinds of treatments.

From all of these there is only one finding that is of value in prognosis, and that is duration of the psychosis before treatment. There is a consistent relation between short duration and good response to treatment.

While in pre-psychotic personalities there were contradictory results in patients graded from B to D, there were no recoveries in 8 patients graded E. These had been in trouble since infancy and had shown no promise at any time.

Results in 154 insulin-treated cases sug-

TABLE I

A—1936-38

Of	82	cases	44%	were	recovered	or	much	improved	at	the	end	of	treatment
"	82	"	39%	"	"	"	"	"	"	"	"	"	6 months
"	82	"	34%	"	"	"	"	"	"	"	"	"	1 year
"	76	"	32%	"	"	"	"	"	"	"	"	"	2 years

B—1939-40

Of	71	cases	63%	were	recovered	or	much	improved	at	the	end	of	treatment
"	53	"	62%	"	"	"	"	"	"	"	"	"	6 months
"	42	"	57%	"	"	"	"	"	"	"	"	"	1 year
"	18	"	61%	"	"	"	"	"	"	"	"	"	2 years

TABLE II

Of	154	cases	53%	were	recovered	or	much	improved	at	the	end	of	treatment
"	135	"	48%	"	"	"	"	"	"	"	"	"	6 months
"	124	"	43%	"	"	"	"	"	"	"	"	"	1 year
"	94	"	37%	"	"	"	"	"	"	"	"	"	2 years
"	60	"	28%	"	"	"	"	"	"	"	"	"	3 years *
"	23	"	17%	"	"	"	"	"	"	"	"	"	4 years

* One recovery was not influenced by insulin.

To follow cases beyond the completion of insulin or any other therapy is to bring in complicating facts. In our insulin treated group there were 11 patients who immediately recovered, then relapsed and recovered again with further shock treatment (in 9 cases a second insulin shock series, in 1 case each a metrazol and electroshock series). One patient, unimproved by insulin, recovered after two years in the Allentown State Hospital. One patient has a full remission and active progress in his work for a full year, then relapsed and died of insulin shock therapy in another hospital.

We give tables of the duration of illness before treatment, age at treatment, prepsychotic personalities, family histories, sub-

TABLE III

PERCENTAGE OF IMMEDIATE REMISSIONS ACCORDING TO DURATION OF ILLNESS BEFORE TREATMENT

	Less than 1 year, per cent	1 to 2 years, per cent	More than 2 years, per cent
Treatment A 46	36	33	
35			
Treatment B 79	70	46	
47			

TABLE IV

PERCENTAGE OF IMMEDIATE REMISSIONS ACCORDING TO AGE AT TREATMENT

	Less than 18, per cent	18 to 28, per cent	28 to 38, per cent	More than 38, per cent
Treatment A 57	54	32	..	
35				
Treatment B 31	71	78	60	
47				

gest that in 5 years the recovered and much improved cases will not be far different from control cases who have received no shock treatments. This pessimistic suggestion is modified by three facts:

(1) Recoveries made under insulin have been prompt: this has given them more years of health in the years in which they have been observed, even though they have relapsed.

(2) The small group followed for four years after insulin is weighted with cases of long duration.

(3) Most important, the treatment of 1936-38 is now considered inadequate. The more thoroughly treated cases of 1939-40 start with a much higher recovery rate (63 per cent) which shows only a small loss (57 per cent) at the end of the first year after treatment. Our hopes must be pinned to this second series of cases.

TABLE V

PERCENTAGE OF IMMEDIATE REMISSIONS ACCORDING TO PERSONALITY GRADING

	A to E	B, per cent	C, per cent	D, per cent	E, per cent
Treatment A 35		27	42	55	0
Treatment B 47		100	84	52	0

TABLE VI

PERCENTAGE OF IMMEDIATE REMISSIONS ACCORDING TO TYPES

	Paranoid, per cent	Hebephrenic, per cent	Catatonic, per cent	Mixed, per cent	Simple, per cent
Treatment A .. 35	31	44	46	75	0
Treatment B .. 47	72	54	87	50	0

TABLE VII

FAMILY HISTORIES

In 87 cases where there was a psychosis in siblings, parents or grandparents, the percentage of recovered and much improved was 56.

In 63 cases where family history was negative the percentage of recovered and much improved was 50.

INDIVIDUAL PATIENTS

There were 17 patients who were much improved or recovered at the end of the third year. A short account of each follows.

(1) Completely well since treatment, he has graduated from college and is teaching.

(2) Completely well at her teaching, she has taken up new avocations.

(3) Completely well, he is an engineer taking much responsibility.

(4) Completely well, he has graduated from college.

(5) Completely well, a housewife.

(6) Completely well, he is more free and easy than before, well employed.

(7) Much improved on discharge, she gradually and steadily improved to full recovery.

(8) Much improved but restless: is now well employed.

(9) Much improved on discharge and has gained since. Her identical twin sister recovered from schizophrenia without shock therapy.

(10) A boy of 19 dropped psychotic, but kept neurotic symptoms for a year after insulin and then fully recovered.

(11) After many swings into mild depressions a young man improved and is now well and employed.

(12) A young man is considered much improved who is somewhat grandiose but who holds a good job.

(13) A girl was much improved but somewhat depressed for two years—then improved further.

(14) A patient made a full recovery for two years in which she won promotion at her work: she then relapsed. A second insulin series brought recovery for a year. Shortly after the end of the third year she relapsed and further treatment brought no improvement.

(15) A boy of 23 recovered in 1937, relapsed after a year to a psychosis not so severe as his previous one, recovered under a second insulin series in 1938 and has remained well.

(16) A girl was much improved, relapsed after a year and recovered again under a second insulin series.

(17) A woman of 29 was unimproved after insulin. After two years at the Allentown State Hospital she recovered and found a job as stenographer.

BIBLIOGRAPHY

1. Bond, E. D., Hughes, J., and Flaherty, J. A.: Am. J. Psychiat., **96**: 317, 1939.

2. Strecker, E. A., and Willey, G. F.: Jour. Mental Science, **73**: 9, 27.

3. Bond, E. D., and Braceland, F. J.: Am. J. Psychiat., **94**: 263, 1937.

ELECTROENCEPHALOGRAPHIC STUDIES OF CORTICOHYPOTHALAMIC RELATIONS IN SCHIZOPHRENIA [1]

By ROY R. GRINKER, M.D., and HERMAN M. SEROTA, M.D., Ph.D.

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Although studies of schizophrenic states by means of the electroencephalograph were at first unproductive, later investigations revealed a variety of alterations. Hoagland(9) reported that wide random swings, so-called delta waves, were more frequent than in the normal. Gibbs, Gibbs and Lennox(5) demonstrated that curves from schizophrenics were frequently similar to those elicited from epileptics, indicating a positive relationship between these two clinical entities. They expressed the hope that like epilepsy, schizophrenia, by virtue of its cerebral dysrhythmia, may be amenable to chemotherapy. Davis(2, 3) classified schizophrenia into three groups according to their EEG patterns. Group I was indistinguishable from normal, group II resembled epilepsies in their dysrhythmic curves and group III showed choppy patterns suggestive of organic brain pathology.

Such classification into categories, like many investigations into the biological characteristics of individuals suffering from mental disorders, is based upon the state of activity of the brain under basal or resting conditions. It permits of little insight into the character of responses during action or stress, that is, under those dynamic conditions during which the schizophrenic breaks down and shows his deviation from normal.

We have developed(6) and used(8) a "hypothalamic" or basal lead to investigate action currents from the base of the brain in man in order to study the dynamic relationship between the hypothalamus and cortex as recorded by the EEG under varying experimental conditions. In animals we have demonstrated the irritability of the hypothalamus to intravenous metrazol and adrenalin and its driving effect upon the cortex. In human subjects we have produced the same effects by electrical stimuli transmitted through the basal lead and by emotionally crucial verbal stimuli. This is a preliminary report of similar experimental studies performed on schizophrenic subjects.

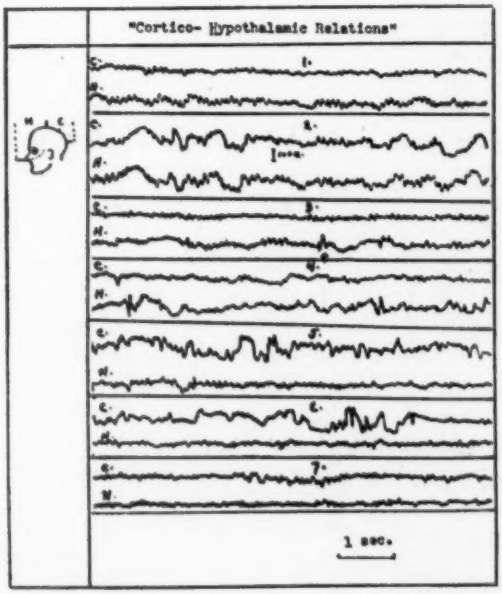

Fig. 1.—Psychoneurotic patient, (1) resting curve, (2) after crucial emotional stimulus administered verbally, (3) reassurance, (4) electrical stimulation, (5) 6 minutes after electrical stimulation, (6) 7 minutes after stimulation, (7) return quiescent stage 10 minutes after stimulation.

Technique and Procedure

Patients were placed in recumbent position on a couch in a copper screened EEG cage. The hypothalamic lead was inserted as previously described(8). A single cortical lead was placed over the occipital region with reference leads either on the vertex or ear. The Offner electroencephalograph was employed in the usual manner. After a base line was established in the 2 curves, 3 pro-

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Virginia, May 5-9, 1941.

From the Department of Neuropsychiatry of the Michael Reese Hospital.

cedures were adopted as routine in the study of each patient in the order described, with adequate intervals between each.

1. Cold.—The patient's body temperature was recorded by mouth. Ice bags were then packed closely around the body and left in place for 30 minutes while a continuous EEG of hypothalamus and cortex was recorded. Body temperature was measured at frequent intervals. Accurate measurements were not made by thermocouples since we were not interested in quantitative measurements so well described by Finkelman(4) but in the presence or absence of responses in the action potentials of the brain.

2. Adrenin.—0.5 c. c. of 1 : 1000 adrenin was injected intramuscularly and the subjective responses were elicited at frequent intervals while a continuous EEG was recorded. In a few experiments intravenous adrenalin was used but the subjective and objective reactions in all cases were so severe that differences between normals and schizophrenics could not be detected.

3. Electrical Stimulation.—This was made into the hypothalamic lead by a Harvard inductorium the secondary coil of which was pushed to the 2 cm. marking and maintained until there was an increase in body tonus and a forward flexion of the trunk. This was repeated in some cases several times. During the stimulus period of several seconds the EEG was stopped and restarted immediately afterward.

4. Amytal.—In some patients 0.45 gm. of sodium amytal was injected intravenously and a continuous EEG record taken with observations on the state of sleepiness.

The subjects experimented upon were all patients in the psychiatric unit of the hospital. They were quiet and cooperative individuals usually ill for a very short time. Schizophrenics were chosen for this study and depressed, neurotics and normals were used as controls. In the later experiments patients were taken as "unknowns" and the results correlated with other data elicited clinically. All the subjects were studied carefully by clinical and psychological methods during their stay in the hospital, which was usually of several weeks' duration. In a few cases Rorschach tests were made.

Report of Results [2]

Case 1.—A. A. (C74637). Salesman, aged 35, entered the psychiatric unit of the Michael Reese Hospital, March 25, 1940, in a state of excitement, shouting and singing. He had suffered several previous episodes of excitement, insomnia and anorexia but never required medical care. At other times he had been quiet and retiring. One week before, he became suspicious that he was being accused of stealing and homosexuality. He became disturbed when he felt sexual urges toward a nephew. After 21 insulin shocks the patient quieted and returned home May 5, 1940. Diagnosis: acute catatonic excitement.

EEG studies showed a resting cortical rhythm of 8 per sec. 100 μv in amplitude. In the basal curve there was a 4-5 per sec. rhythm and also waves synchronous with that of the cortex. Cold applied externally for 30 minutes reduced body temperature from 98.4° to 97.8° F. The EEG change was only an increase in alpha frequency, regularity and voltage in the hypothalamic lead. 0.5 c. c. of 1-1000 adrenin injected intramuscularly gave no subjective effect or alteration in the EEG. Electrical stimulation of the hypothalamus caused no change in either hypothalamic or cortical waves.

Case 2.—D. L. (C88664). Male, university graduate in accounting, aged 22, entered the hospital January 8, 1941. He had been in serious conflict for eight years over sexual and love affairs as well as his work. He kept himself isolated and indulged in much fantasy. Practical application of his knowledge was difficult and caused headaches, although in his own concept his importance was great. His defenses against inferiority feelings were intellectual. Little affect was demonstrated and he made no real human relationships. The Rorschach test revealed a schizophrenia with suicidal trends in a long-standing schizoid character. Shortly after discharge February 5, 1941, patient entered a state hospital. Diagnosis: schizophrenia.

EEG Studies.—The frontal cortex showed much beta activity and occasional low voltage alphas. In the occipital cortex the 10 per sec. rhythm was irregular and there were small bursts of 20-40 μv 25 per sec. activity. External cold for 30 minutes caused a drop of temperature from 98.6 to 98.2° F. After 19 minutes alphas appeared in the hypothalamus and the cortical alphas increased in voltage, appeared in longer bursts, more regularly and in greater per cent time. Intramuscular adrenin, 0.5 c. c. of 1-1000, produced only subjective sensations of cold and slight increase in beta activity in the hypothalamus. Electrical stimulation showed no change in cortex or hypothalamus, alphas reappearing as they were before, within 15 seconds.

Case 3.—J. C. (C84258). Male, high school student, age 16, who had apparently been normal

[2] Because of limitations of space only a part of our case material is presented in detail.

prior to 2 weeks before entrance to the hospital October 1, 1940. He had been at Fort Sheridan in training when a horse ran away with him. He developed personality changes, avoiding friends and company, sitting alone and reading a great deal. He was extremely perplexed but showed no external evidence of affect, in fact had a poverty of emotional expression. Diagnosis: catatonic schizophrenia. After 23 insulin shocks patient was improved and returned to school, December 5, 1940, still quiet and retired.

EEG studies showed regular, well developed 10 per sec. rhythm. In the hypothalamus a 24 per sec. rhythm was outstanding. Cold applied externally reduced the body temperature from 98.8 to 98° F. In 6 minutes alphas of low voltage appeared in the hypothalamus, and the cortical alphas became more regular and increased in voltage from 60 to 100 μv. Adrenin caused no subjective effect and no change in the EEG except a slight increase in beta waves of the hypothalamus. Electrical stimulation repeated twice evoked no EEG response in either lead. Intravenous injection of 0.5 gm. sodium amytal resulted in an increase in verbal activity. In the cortex there was a marked increase in beta activity. The voltage of the whole curve was decreased and greatly irregular with bursts of 14 to 20 per sec. waves waxing and waning in spindles. In the hypothalamus there was a similar 14 to 16 per sec. rhythm quite regular in appearance.

Case 4.—J. P. (C73814).—A 24-year-old male entered the psychiatric unit March 1, 1940, after several years of illness. Development had been normal except for a great deal of crying in infancy. He had never been employed, made no effort to seek work but sat around the house. He had no friends and no heterosexual interests. Lately he worried about his supposed sexual deficiency and had other numerous somatic complaints for which he wanted his teeth extracted. He became careless about cleanliness and lately very argumentative. Diagnosis: simple schizophrenia. After 26 insulin comas he left the hospital April 25, 1940, unimproved.

EEG Studies.—External cold caused no change in body temperature and no effect on the brain waves. Likewise adrenin, electrical and verbal stimuli caused no change in the EEG tracings of the hypothalamus or cortex. Intravenous injection of 0.5 gm. sodium amytal caused a sleepy feeling in 0.5 minute. The cortex showed increasing irregularity and with light sleep 14 per sec. waves developed followed by marked increase in random delta activity. In the hypothalamus 14 per sec. rhythm also developed but not synchronous with that of the cortex. After insulin therapy there was a regular alpha rhythm in the cortex of greater amplitude than before and in the hypothalamus 4 per sec. waves, previously not present, appeared. Also great runs of beta waves appeared in the frontal cortex.

Case 5.—C. P. (C75766). A 34-year-old female entered the psychiatric unit April 19, 1940. She had been nervous for many years and 7 years ago after the birth of a son developed many somatic complaints and became worried over trivialities. For the last 3 or 4 years she had become less attached to the child. Weakness, crying, fainting spells, depression and loss of weight progressively became worse. With insulin and metrazol treatment patient seemed less disturbed but regressed markedly, exhibiting conduct of a child 2 or 3 years old. She was shy, bashful, toyed with food, and held it in her mouth when spoon-fed. She made sucking movements and soiled herself. Patient was discharged July 7, 1940, to enter the state hospital. Diagnosis: simple schizophrenia.

EEG Studies.—After 30 minutes of external cold the body temperature sank 0.2° F. The effect on the brain waves was a slight increase in alpha voltage and frequency in the hypothalamus. After intramuscular adrenin in 4 minutes there was some palpitation but no effect on the EEG. Electrical stimulation of the hypothalamus elicited no change except mild increase in beta activity in the hypothalamus.

Case 6.—P. D. (C70041). Boy, 15 years old, student, entered the psychiatric unit December 15, 1939, with the diagnosis of schizophrenia. For a month he had been withdrawn, showing fatigue-like spells, timidity and headaches for which he absented himself from school. The onset dated from the day that he discovered a beloved single aunt in sexual intercourse with her lover. He threatened to kill the man and by his conduct forced the aunt to leave home. The patient showed clinical evidence of much repressed aggression which was confirmed by the Rorschach test. Diagnosis: anxiety neurosis. Patient was discharged from the unit January 17, 1940, and after a few months psychotherapy was able to return to school and seemed to have recovered.

EEG Studies.—Adrenin injected intramuscularly caused an intense subjective effect of anxiety. The hypothalamic and cortical curves responded with long sustained prominent increase in beta activity, huge swings of delta activity and marked accentuation of 4 per sec. hypothalamic rhythm. Exactly the same result was obtained on electrical stimulation of the hypothalamus.

Case 7.—A. B. (C90155). A 24-year-male university student, who had many cyclic attacks of depression and elation, was admitted to the psychiatric unit with a tentative diagnosis of schizophrenia. He was a precocious child from a broken home, extremely narcissistic, but with a markedly inhibited personality. Clinically he showed a depressive reaction and the diagnosis of psychoneurosis and not schizophrenia was confirmed by the Rorschach test.

EEG Studies.—Cortical waves showed alphas appearing in irregular bursts of 3 or 4 together of 25-75 μv with interposed beta rhythm. In the hypothalamus there were 30 μv alphas. External cold for 30 minutes caused a subjective feeling of cold but no change in body temperature. The

cortical alphas increased to 100 μv. In the hypothalamus at first the alphas were unchanged and the 4 per sec. low voltage waves became prominent, then the alphas increased to 75 μv. Toward the end of the 30 minutes the hypothalamus showed an increase in beta rhythm and the alphas decreased in the cortex. Adrenin injected intramuscularly caused a palpitation, feeling of fright and great wish to breathe deeply. There was a marked increase in beta activity in hypothalamus and cortex within 1 minute and the alphas disappeared. In 4.5 minutes the activity began to quiet but returned in gradually decreasing bursts for several minutes. Fright turned into sadness toward the end of the effect. Electrical stimulation caused a marked increase in beta activity with irregularity and decline in per cent time of alphas. Subjectively there was a feeling of dissolution.

Case 8.—J. Mc. (C91807). A 45-year-old farmer with recurrent mild depressions. No anxiety or suicidal trends. Diagnosis: recurrent melancholia.

EEG Studies.—External cold raised the body temperature 0.5° F. and objectively resulted in increase in hypothalamic betas, decrease in alphas and lessening of per cent time of alphas in cortex. Adrenin and electrical stimuli were followed by marked increase in beta activity and delta waves in both leads. In the hypothalamus 2 per 5 second delta waves also appeared.

Summary of Results

In a group of various types of psychoses, mostly schizophrenics, three types of stimuli were applied. These consisted in external thermal change (cold), internal chemical change (adrenalin), direct stimulation of the central autonomic nuclei (electrical) and in some cases ideational stimuli of emotional significance (verbal). The responses were uniformly negative or negligible in the schizophrenics.

External cold produced a drop in body temperature instead of a compensatory rise(4) and little subjective response in the form of chilly or cold sensations. In the hypothalamic EEG in 2 cases there was no effect, in 6 cases the alpha rhythm became more prominent with slight to moderate increase in voltage and in one case alphas were reduced. In the cortex 3 cases showed an increase in alpha voltage, the remainder showed a decrease in alpha amplitude and frequency or no effect. This was contrasted by the response in the non-schizophrenic patients in whom there was a compensatory rise in body temperature or no change and a subjective feeling of coldness. The EEG correspondingly showed an initial marked increase in alpha frequency in cortex and hypothalamus followed by a marked increase in beta activity in the hypothalamus. Such activity was not seen in a single schizophrenic patient.

Adrenalin when injected intravenously offered no means of differentiation between schizophrenic and non-schizophrenic subjects. Both groups reacted with violent subjective responses of fear and showed markedly disorganized curves from both hypothalamic and cortical leads. Wide random delta swings with continuous excessive beta activity and loss of alpha rhythm were noted.

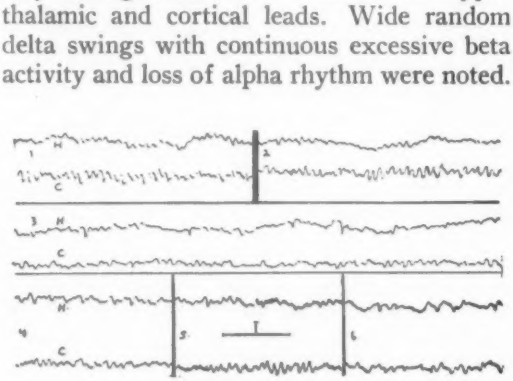

Fig. 2.—Experiments with external cold, (1) schizophrenic before and (2) after cold, showing little response, (3) neurotic before cold and (4, 5, 6) neurotic after cold in various phases in chronological order. Note in (5) the increased fast activity in hypothalamus and increase in cortical alpha voltage. In all figures H. is the hypothalamus and C. is cortex.

However small doses of intramuscular adrenalin gave a sharp differentiation between schizophrenic and non-schizophrenic subjects. In the non-schizophrenics there were marked subjective responses of anxiety, agitation, breathlessness, restlessness and palpitation. In all, beta activity of the hypothalamus increased markedly. Cortical activity likewise was altered in that large delta swings appeared with superimposed beta or 25 per sec. rhythm. The alpha rhythm correspondingly disappeared in the hypothalamus and the 4 per sec. rhythm became clearer. In one case recurrent bursts of beta activity reappeared in both leads, only gradually disappearing. In one case the cortical response was an initial increase in beta activity followed by high voltage alpha rhythm. Schizophrenics on the other hand showed little response. In 5 cases there was no sub-

jective effect, 2 felt a little palpitation, one slightly cold and one mildly excited. In only 2 cases was there a slight increase in hypothalamic beta activity, the remainder were unresponsive and in no case was there any change in the cortical waves.

Electrical stimulation of the hypothalamus showed even a sharper contrast between schizophrenic and non-schizophrenic subjects. The effect on the latter has been reported elsewhere(8) in our studies of psychoneurotic patients of whom we have now stimulated electrically 22 cases. In the present series 3 psychotic but non-schizophrenic patients were stimulated and they showed

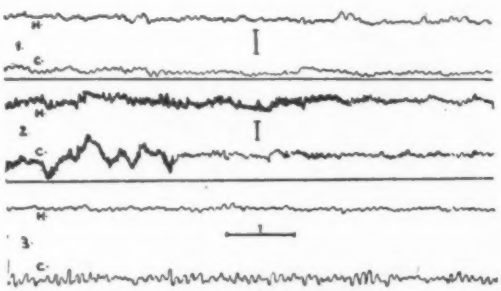

FIG. 3.—Experiments with intramuscular adrenalin, (1) neurotic before and (2) after injection. Note the marked increase in rapid activity (beta) and the increased delta swing, (3) the unaltered schizophrenic after a similar adrenalin injection.

responses identical with 2 more neurotics also here included. In all, mild to severe subjective responses occurred; in one there was a terrifying feeling of dissolution. Marked increase in beta activity of the hypothalamus resulted with some delta swings and occasional 3-5 per sec. waves. Bursts of betas recurred after the curve seemed to have stabilized (condensor effect). In the cortex beta activity with loss of alphas and disintegration of the curve with random delta activity appeared first. Then alphas returned irregularly and markedly increased in voltage. The schizophrenic patients showed no subjective response and in only 2 cases slight increase in 25 per. sec. waves in the hypothalamus and in one case in the cortex. Even repetition of the stimulus had no effect. The electrical response was monotonously negative.

Verbal stimuli of a crucial nature when applied to the resting neurotic patient have been described elsewhere(8) and are surprisingly similar in their effects to electrical stimulation although quantitatively less. When applied to the schizophrenic no response could be observed.

Sodium amytal was injected intravenously in three patients of this series to the point of light sleep. In this stage the patient was still able to carry on a slow but coherent conversation. In the cases chosen the degree of retreat from reality was not as marked as is usually the case with the "sodium amytal interview" with schizophrenics. The stage of wakefulness during the effect

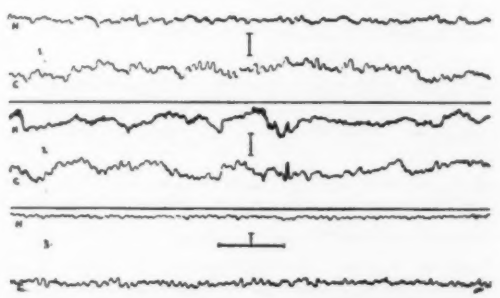

FIG. 4.—Experiments with electrical hypothalamic stimulation, (1) neurotic before and (2) after electrical stimulation, (3) the lack of effect on the schizophrenic of the same stimulus.

of amytal was quite similar to the optimal desired. It is in this stage that a quite striking form of bioelectric pattern is obtained from the electrode in the region of the hypothalamus. In contrast to the usual rapid activity elicited here, the curve is characterized by a 14-16 per second rhythm which waxes and wanes in a fashion quite similar to the early stages of sleep as recorded from the cortex. Simultaneously with these phenomena the cortex shows an unusual form of 14 to 20 per second rhythm which at times appears to be coincident with that of the basal lead. The cortical pattern appears to be more fluid and variable than that of the hypothalamus.

DISCUSSION

Psychosomatic research in schizophrenia has been directed not, as in the organ neurosis, toward the search for specific emo-

tional causes of a known somatic dysfunction but in determining biological deviations responsible for or concomitant with a known psychotic syndrome. In earlier studies of constitution and modern biochemical assays, great emphasis has been placed upon fixed body structure and resting basal conditions which have given glimpses of the static biological organization(10). However, what we know from the psychodynamics of the schizophrenic indicates that differences from the normal will probably be found in degree or quality of biological adaption to varying degrees of stress.

McFarland and Goldstein(12) in an excellent review of the biochemistry of de-

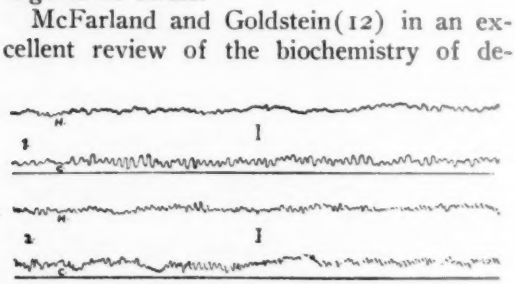

FIG. 5.—Experiments with intravenous sodium amytal, (1) before and (2) after injection and (3) another case, after effect has become pronounced. Note the 14-20 per second waxing and waning palisades in both hypothalamus and cortex.

mentia precox indicate that biochemical studies of schizophrenia have done little to lift the fog of confusion, yet several indications of physiological disturbances appear to exist in a disturbed carbohydrate and lipoid metabolism and a greater variability than normal of biochemical constitutents which makes any valid analysis difficult. This variability perhaps represents as a general principle what may be termed defective homeostasis. "The adaptive mechanisms possessed by the schizophrenic to preserve the 'steady state' are defective and hence he swings like a physiological pendulum from one extreme to the other, whereas the adaptive swing of the normal individual is a much shorter and slower one."

This view coincides with the widely held concept that the schizophrenic reacts poorly or clumsily to physical stress of the environment(11). Accumulated data indicate that the schizophrenic has decreased oxygen consumption, deficient heat regulation, hypoplastic arteries and deficient peripheral circulation giving rise to coldness, claminess and cyanosis of the extremities, low blood pressure, low pulse rate, and high tolerance for thyroid preparations(13). So many of these defects in the schizophrenic are in sharp contrast to the effect of excitation of the hypothalamus that the data in themselves suggest that a study should be made more directly of the hypothalamic(14) function in the schizophrenic.

Methods for such a study have been lacking because the patient is, after all, an intact human being on whom only limited experimentation can be performed. Our method, although somewhat crude, gives some information of the electrical responses of the hypothalamus and cortex simultaneously under a variety of modifiable external and internal conditions. The preliminary report indicates that the hypothalamus is unresponsive or poorly reactive to thermal, pharmacological and electrical stimuli and that its driving effect upon the cortex is likewise absent or deficient. This seems to indicate that the biological deficiency is not necessarily a diseased or morphologically altered structure but a physiological deficiency in a specific neurological organization, that is, in hypothalamic-cortical relations. There are also manifested concomitant defects in hypothalamic integration of peripheral autonomic functions which express themselves clinically and biochemically but in themselves are not causal to the psychotic constitution.

Our series of schizophrenics some of which are herein reported is not large since it has not been easy to obtain patients sufficiently cooperative for experimental studies of this type. We are unable to correlate quantitative responses with clinical types in such a small number of patients. Our impression is that in simple schizophrenics and hebephrenics hypothalamic activity is most severely reduced. However, catatonics demonstrated the same phenomenon. One paranoiac without other features of schizophrenia reacted like the non-schizophrenic psychotics and psychoneurotics. It is interesting to note that intravenous adrenalin caused profound reactions in the EEG, even in schizophrenics,

indicating that to such unphysiological stimuli the hypothalamus is able to respond. There is, of course, other evidence that considerable central autonomic regulation is present even in the schizophrenic, for under ordinary conditions hypothalamic functions are obviously present in the processes of living.

Attempts have been made to ascribe the schizophrenic syndrome to defects in the diencephalon(14), especially since the similarity with chronic epidemic encephalitis has been recognized. Yet the bizarre motor behavior, impulsive explosive aggressive activity and catatonic excitement indicate release of lower levels normally under cortical control. If hypothalamic hypo-activity were due to excessive inhibition from above with sudden episodic periods of release, strong stimuli such as we have applied to the hypothalamus should be able to overcome this inhibition, but such was not the case. Furthermore, release phenomena in the schizophrenic explosions are not autonomic in nature but occur essentially in the sphere of the somatic motor nervous system. The absence of autonomic components including changes in blood pressure in the expression of schizophrenic rage has been noted by us in several cases under close observation during psychological studies. The anger is usually "cold," the hostility well adapted to destruction and its termination abrupt.

At the risk of being accused of "neurologizing" we wish to venture into pure speculation as to how a biological defect in hypothalamic function may form the basis for schizophrenia-in-the-making. The degree of failure of the adaptive hypothalamic homeostatic mechanism determines the degree of external frustration or privation which becomes either physically or psychologically traumatic. The greater this failure the slighter the stress need be to become traumatic, frustrating, rejecting, etc. The psychosis is then never a neurological phenomenon but an interaction between environment and constitution.[8] Experience, specific content and emotional meaning are of equal importance in the psychosis as the biological organization.

As we see it the major clinical dynamic phenomena in schizophrenia are the struggles with aggressive motor behavior which require strong inhibition, frequently explode violently or are released in regression to archaic patterns. We suggest that deficiency in hypothalamic activity throws the stress of adaption into the motor field which in normal individuals is utilized in the service of autonomic regulation, especially when the stimulus is strong. For example, if body temperature cannot be regulated adequately in response to change by the hypothalamic thermostat the environment is altered or the individual changes his environment, both motor responses. The schizophrenic is thus forced into motor acts of adaption which, teleologically expressed, either attack the obnoxious environment or withdraw from it.

Such automatic "old motor system" activity involves the individual in what may be the real psychological conflict of the schizophrenic, that of mastering his explosive, hostile reactions to environmental stimuli. Equilibrium may be established by an inhibiting cortex only to be upset by excessive environmental stress. These upsets are usually explosive and temporary but under certain conditions detonate all dynamic relations and psychotic regression results. During equilibrium recourse to fantasy, autistic thinking or even hallucinations may be an auxiliary method of dealing with adaptation-requiring situations.

The physiology of the highest level of the nervous system as it contributes to ego function suffers, and we see it clinically as rigid and abnormal, from several sources. These constitute: (1) the lack of hypothalamic driving force; (2) the stress of damping down excessive motor activity; (3) intellectual defense systems of withdrawal; and (4) substitutive fantasy, autistic, hallucinatory modifications of disagreeable environment.

Thus we postulate that the schizophrenic syndrome as we see it in our clinical experience is a side-chain of conflictual events in which varying degrees of mastery either on the side of cortex or old motor system occur,

[8] We hesitate to use the term constitution, for it connotes an unalterable congenital organization. Yet such a deficient function as is evidenced by the hypothalamus may be the result of too early and/or too great stress placed upon it during intra-uterine existence, birth or the first few days of life.

and that this side-chain is a result of the basic schizophrenic deficiency which is a product of interaction or interplay between a varyingly deficient adaptation mechanism and varyingly severe stress.

This thesis does not negate our psychological concepts of the psychosis and the amenability to psychological treatment, for the external stresses acting upon a deficient adapting mechanism are psychological and the conflict between motor adaption and environmental prohibitions and dangers are surely psychological. It is the latter conflict that is most amenable to therapy. Whether pharmacological shock therapy in its temporary stimulating effect on the central autonomic system can achieve more than a temporary "lift" in hypothalamic functions is still undetermined. Our speculations attempt to superimpose psychodynamics upon neurodynamics, a goal of psychobiology. They suggest that in schizophrenia the psychomotor apparatus and its dynamics be investigated further.

Conclusions

Using hypothalamic and cortical leads electroencephalographic studies in schizophrenics give the following preliminary results.

1. Reaction to external cold is deficient in that no reactive hyperthermia results and little electrical activity in hypothalamus or cortex can be observed. The normal or neurotic shows a definite reaction in both leads.

2. Adrenalin injected intravenously causes violent subjective and objective reactions but intramuscularly causes little subjective and usually no objective effect on hypothalamus or cortex in schizophrenics. The intramuscular injection, however, causes a prompt and striking effect in normals and neurotics electrically as well as subjectively demonstrable.

3. Electrical stimulation of the hypothalamus of schizophrenics caused minimal or no reaction in that structure demonstrable by the EEG or secondarily in the cortex. Normal and neurotics showed a profound excitation of hypothalamus and cortex, frequently with prolonged "condensor" effect, and usually subjective responses as well.

4. Verbal stimuli when applied to schizophrenics elicited no excitation in either lead whereas excitability from both has been recorded in neurotic subjects.

5. Sodium amytal injected intravenously showed a typical hypothalamic and cortical response, more striking in the hypothalamus, which further study may correlate with the "amytal interview" effect, and be related to the selective action of barbiturates.

6. Speculations have been presented regarding the fundamental deficiency of dynamic action of the hypothalamus in schizophrenia and its possible secondary effects in the production of the essential psychosis in the psychomotor system.

Bibliography

1. Beck, S. J.: Personality structure in schizophrenia. Nerv. and Ment. Dis Pub. Co., New York, 1938.

2. Davis, P. A.: Evaluation of the electroencephalograms of schizophrenic patients. Am. J. Psychiat., **96**: 851, 1940.

3. Davis, P. A., and Davis, H.: The electroencephalogram of psychotic patients. Am. J. Psychiat., **95**: 1007, 1939.

4. Finkelman, I., and Stephens, W. M.: Heat regulation in dementia precox. Reactions of patients with dementia precox to cold. J. Neurol. and Psychopath., **16**: 321, 1936.

5. Gibbs, F. A., Gibbs, E. L., Lennox, W. G.: The likeness of the cortical dysrhythmias of schizophrenia and psychomotor epilepsy. Am. J. Psychiat., **95**: 255, 1938.

6. Grinker, R. R.: A method for studying and influencing corticohypothalamic relations. Science, **87**: 73, 1938.

7. Grinker, R. R.: Hypothalamic functions in psychosomatic interrelations. Psychosom. Med., **1**: 19, 1939.

8. Grinker, R. R., and Serota, H. M.: Studies on corticohypothalamic relations in the cat and man. J. Neurophysiol., **1**: 573, 1938.

9. Hoagland, H.: Electroencephalograms in schizophrenia. Arch. Neurol. and Psychiat., **39**: 210, 1938.

10. Kirky, G. H., Davis, T. K., and Riley H. A.: Schizophrenia. Proc. Assoc. for Research in Nerv. and Ment. Dis., Vol. X, Williams and Wilkins, Balto., 1931.

11. Lewis, N. D. C.: Research in dementia precox. National Com. for Mental Hygiene, Monograph, New York, 1936.

12. McFarland, R. A., and Goldstein, H.: The biochemistry of dementia precox. A review. Am. J. Psychiat., **95**: 509, 1938.

13. Rheingold, J. C.: Autonomic integration in schizophrenia. Psychosom. Med., **1**: 397, 1939.

14. Singer, H. D.: Psychoses and the central nervous system. J. A. M. A., **110**: 2048, 1938.

THE VITAMIN B_1 REQUIREMENT DURING INSULIN SHOCK THERAPY[1]

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The treatment of schizophrenia with insulin hypoglycemic shock therapy has afforded many opportunities for the study of the effects of insulin on human patients. The effect of insulin on the cardiac status has received considerable attention. Romano, *et al.*(1) (1936) found that small doses of insulin changed the electrocardiograph, the most constant single change being a diminution of the amplitude, and sometimes a negative deflection of the T wave. De Chatel and Palisa(2) (1935) reported that hypoglycemic doses of insulin produced a lowering or negativity of the T wave in all cases. Hadorn(3) (1936) found that shock doses of insulin depressed the T wave and also produced changes in the ST segment and QRS complex. Messinger(4) (1938) studied the physical signs and the electrocardiographic alterations during the course of insulin shock therapy. The authors are generally agreed that these changes are reversible, also that they might be produced by small as well as large doses of insulin.

Goldman(5) (1940) observed the EKG during the hypoglycemic phase of shock induced by both insulin and protamine insulin, and also the effects produced by numerous shocks required for the treatment of schizophrenia. He found that the depression and inversion of the T wave was the most characteristic change found in almost every patient under the influence of insulin, and that it persisted even on rest days after it was well established by repeated shock periods. The return to normal often took several months. In one of the cases reported the abnormality was present 6 months after treatment was terminated.

The EKG changes described are not pathognomonic of insulin shock therapy or insulin in small doses. Similar changes have been described in alkalosis (Barker, *et al.*(6), 1938), adrenalinemia (Milles and Smith(7), 1937) and vitamin B_1 deficiency (Jolliffe, *et al.*(8), 1939; Dustin, *et al.*(9), 1939; Williams, *et al.*(10), 1940). The treatment of schizophrenia with insulin shock therapy involves physiological alterations other than the administration of insulin, and the possibility that the abnormalities of the EKG might be due to some procedure other than the administration of insulin was therefore investigated.

It seemed significant that the EKG changes were similar to those described in vitamin B_1 deficiency. Jolliffe(11) (1940) has estimated that the addition of as little as 200 calories of alcohol (a substance free of vitamin B) to the average American dietary would reduce the vitamin B/calorie ratio to a safety margin of 10 per cent. Since the insulin shocks are terminated routinely by the oral administration of 150 grams (750 calories) of glucose, a substance also free of vitamin B, it seemed possible that these patients might develop signs of vitamin B deficiency, and that the EKG changes observed were due to such a deficiency. The following studies were conducted to investigate this problem.

Method

Insulin shock therapy was administered to schizophrenic patients using the method of Sakel(12) (1938). Treatment was given on 6 days each week, and each shock was terminated with a tube feeding of 150 grams of glucose in 30 per cent solution. The EKG was taken before treatment was started, and repeated on rest days at various intervals. Twelve patients in group A were treated for 19 to 36 days in the usual manner. Subsequent therapy was modified by the daily administration of 10 mg. of thiamine chloride intramuscularly. A second group of 9 patients was given thiamine for the first 13 to

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Virginia, May 5-9, 1941.

From the psychiatric division, Bellevue Hospital and the department of psychiatry, New York University.

29 days of shock treatment, and then continued without thiamine. A third group of 4 patients was treated in the usual manner, but during the first 19 to 24 days were roused with 25 grams of glucose intravenously. For the remainder of the treatment they were terminated with 150 grams of glucose orally.

Results

Control Group.—The chronic EKG changes which occur during the course of insulin shock therapy have been described by Goldman, and we have found similar alterations in control cases. The EKG was taken before and after treatment on a group of 34 patients. They were treated from 17 to 80 days, and each treatment was terminated with 150 grams of glucose. The EKG taken at the end of treatment showed the following alterations. (1) In 26 cases the T wave in the third lead was depressed, in 8 of which there was an inversion of the T deflection from the positive to the negative side of the isoelectric line. (2) In 5 cases there was no change in the T wave in the third lead. (3) In 3 cases the T wave was elevated. The average change in the 34 cases revealed a depression of the T_3 wave of 0.707 millimeter. Statistical analysis by Fisher's method showed that this average was significant ($t=4.23$). Alteration of the ST segment and fragmentation of the QRS complex was also noted.

Group A.—This group of 12 patients was treated from 19 to 36 days in the usual manner, and after the EKG was taken, therapy was continued with the addition of thiamine (10 mg.) daily. The following changes occurred. (1) Inversion of the T wave in the third lead was observed in 4 instances during the first period of treatment (Fig. 1). In 2 of these cases there was also a reduction in amplitude of the T wave in the second lead. One patient showed a depression of the ST segment. The administration of thiamine chloride reversed the direction of the T_3 wave in 3 of the 4 cases, and the T_2 wave increased in amplitude in both cases in which it had been depressed. (2) The T_3 wave was depressed in 7 of the remaining 8 instances. In 6 patients the T wave was upright and diminished in amplitude (Fig. 2), and in the remaining patient the originally inverted T_3 wave was further depressed (Fig. 3). Diminution in amplitude of the T_2 wave was also noted in a number of cases, but there were no changes of the ST segment or QRS complex in this group. The administration of vitamin B_1 during the remainder of the treatment resulted in an increase in amplitude of the T_3 wave in 5 instances, no change in one case, and a further depression in the last patient. In the one case in which the T_3 wave had been inverted before treatment, the administration of the vitamin reversed the direction of the deflection above the isoelectric line (Fig. 3). (3) The changes of the T_3 wave in this group may be summarized as follows. During the first period of insulin shock treatment without B_1 the T_3 wave was diminished in amplitude in 11 of the 12 cases, the average diminution being 1.25 millimeters. This average was statistically significant ($t=4.19$). The administration of B_1 while shock treatments were continued caused an elevation of the T wave in 9 instances, showed no change in 2, and decreased once. The average change was an increase of 0.89 millimeter, a statistically significant alteration ($t=2.99$).

Group B.—The 9 patients in this group were treated from 13 to 29 days during which period 10 mg. of thiamine were administered daily. Subsequently therapy was continued without vitamin B_1. The EKG taken at the end of the first period revealed the following changes. The deflection of the T wave in the third lead was elevated in 4 cases, depressed in 4 and showed no change in the last instance. The magnitude of the change did not exceed 1 millimeter in any case. This may be compared with the alterations in group A during the first period of therapy in which there was an average depression of 1.25 millimeters.

The following illustrative case is reproduced. The first EKG obtained on patient J. C. (Fig. 4) showed an inversion of the T_3 wave as the only abnormality. After 13 days of insulin treatment with the addition of vitamin B_1 daily, the T wave was found to be less depressed. Further therapy without B_1 for 24 days caused a reversal of the EKG to its original character with a deeper depression of the T_3 wave.

Group C.—The 4 patients in this group

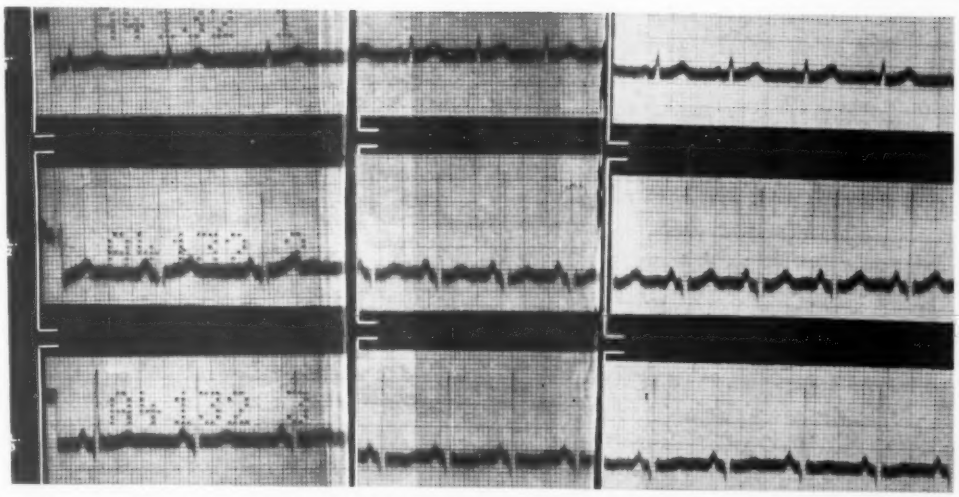

FIG. 1.—Patient P. B. A. Original EKG essentially normal. B. After 33 days of treatment without added vitamin. Note the inverted T_3 wave. C. After 21 days further treatment modified by added vitamin B1. Note T_3 deflection above isoelectric line.

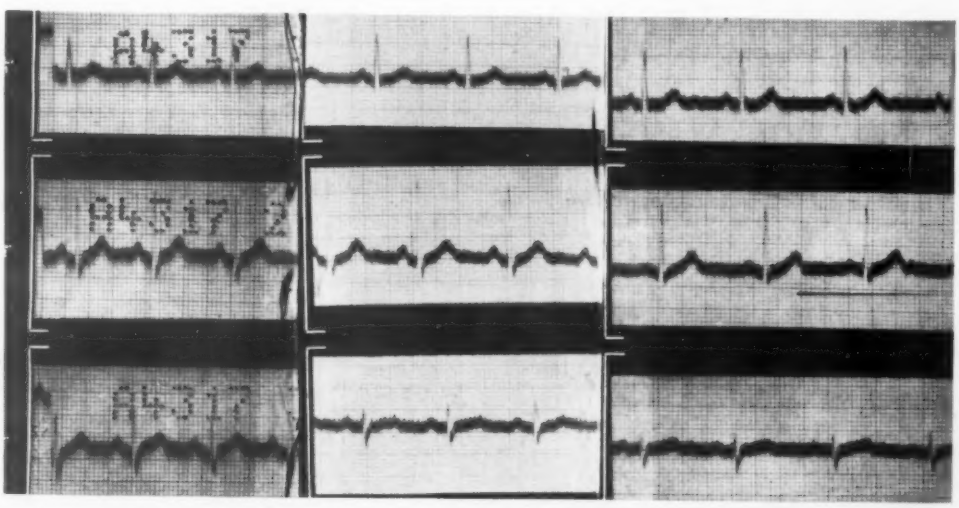

FIG. 2.—Patient C. B. A. Original EKG is normal. B. After 31 days of treatment. Note reduced amplitude of T_2 and T_3. C. After 34 days of treatment modified by the addition of vitamin B1. Note increased amplitude of T waves.

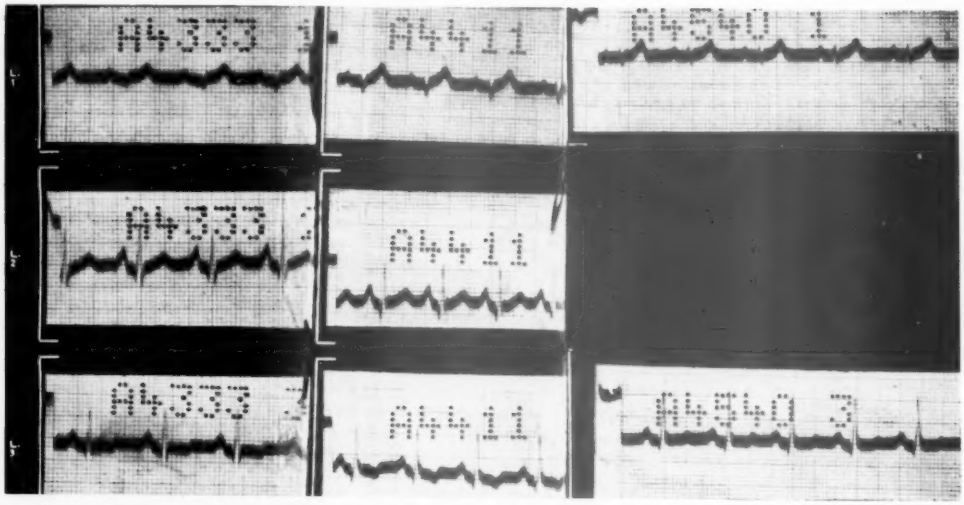

FIG. 3.—Patient J. M. A. Original EKG. Note inverted T_3. B. After 21 days of treatment. Note increased depression of T_3. C. After 21 days of treatment modified by the addition of vitamin B_1. Note deflection of T_3 above the isoelectric line.

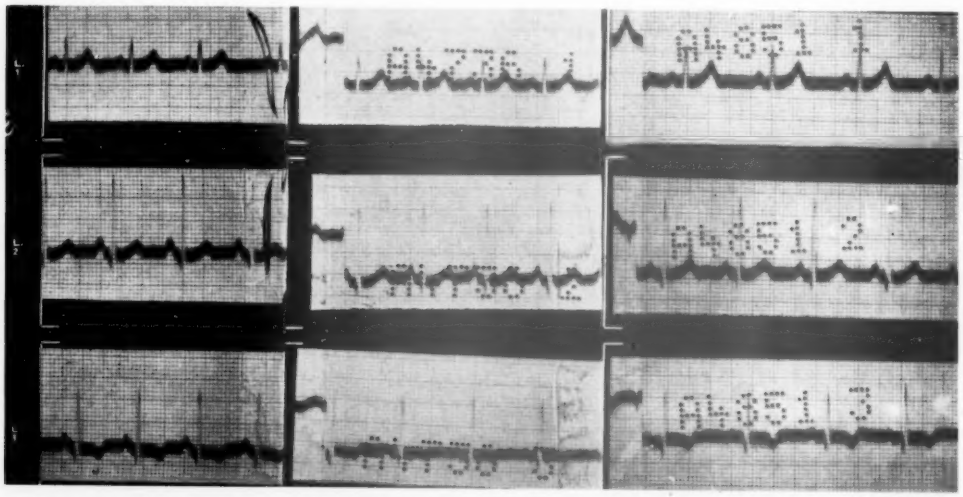

FIG. 4.—Patient J. C. A. Original EKG. Note inverted T_3. B. After 13 days of treatment modified by addition of B_1. Note reduced negative deflection of T_3. C. After 24 days of treatment without B_1. Note change to original EKG.

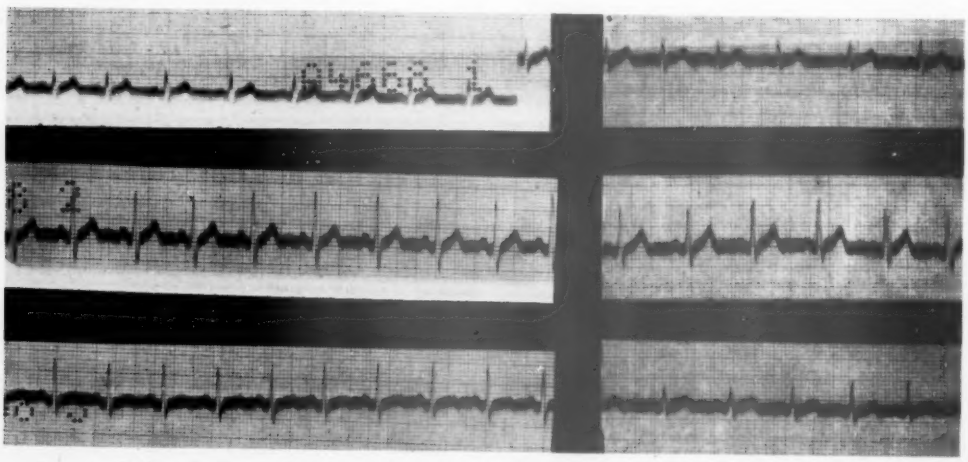

FIG. 5.—Patient I. S. A. Original EKG. Normal. B. After 24 days of treatment during which the patient was terminated with 25 grams of glucose intravenously. Notching of P_3 disappeared. No change in T_3.

were treated for 19 to 24 days with insulin shock therapy, during which each shock was terminated with 25 grams of glucose intravenously. The EKG taken before and after this period of therapy in all 4 cases revealed no essential changes, the T_3 wave in each case changing less than 0.5 millimeter. In patient I. S. (Fig. 5) there was an increase in the upward deflection of the T_3 wave after 24 days of treatment. Notching of the P_3 wave disappeared after treatment.

Discussion

Williams, *et al.*(10) (1940) noted that when the changes typical of vitamin B deficiency in humans appeared, the capacity of the individual for work diminished. No evidence is presented in this report which might indicate whether there is any organic or functional alteration of the cardiac status when the abnormalities appear during the course of insulin shock therapy. We are presenting data on the probable etiology and means of prevention of these changes.

The requirement for vitamin B complex has been shown to be related to the food intake by various investigators (Voegtlin and Lake(13), 1918; Karr(14), 1920; Cowgill (15), 1921; Osborne and Mendel(16), 1922). This relationship has been investigated by Cowgill and Klotz(17) (1927) for different species of animals, who found that the requirement for the vitamin B complex could be approximated by the following formula:

$$\frac{\text{Vitamin}}{\text{Weight} \times \text{Calories}} = K$$

A similar relationship has been pointed out by Plimmer *et al.*(18) (1927). In support of this relationship it has been demonstrated that the requirement for the B complex is increased following the administration of thyroid (Himwich, Goldfarb and Cowgill(19, 20), 1931; 1932) and after increasing the total metabolism by vigorous exercise (Cowgill, Rosenberg and Rogoff(21), 1931 a). The studies of Cowgill, *et al.*(22) (1931 b), Burack, *et al.*(23) (1931) and Sherman, *et al.*(24) (1931) indicate that these observations relate to the antineuritic (B_1) component of the B complex.

The observations of the above investigators were made on animals completely deprived of all sources of vitamin B. More recently Street, *et al.*(25) (1941) noted that the symptoms of chronic vitamin B_1 insufficiency in which animals are maintained on doses of vitamin B_1 smaller than their minimum requirement, are identical with those of acute deficiency, except that they are milder in degree and take longer to develop. After the symptoms are fully developed the administration of vitamin B_1 had no effect. This was in contrast to the animals acutely deficient in that the latter may be restored to normal in a few hours by the administration of thiamine. The authors concluded that the lesions produced are at first functional, and later progress to nerve degeneration of a permanent type.

The existence of such a chronic vitamin B insufficiency in patients undergoing insulin shock therapy is indicated by the previous observations in this report. The EKG changes which occur during insulin treatment are identical with those of vitamin B_1 deficiency, and may be reversed or prevented by the administration of vitamin B_1. That such a lack of vitamin B might readily occur is in agreement with the evidence that there is a mathematical relationship between the food intake and the requirement for vitamin B. According to this relationship the administration of vitamin free glucose would increase the denominator of the above formula, the K value would fall below the minimum vitamin B requirement and symptoms develop. Observations of the third group of patients studied further support this conclusion. In these cases the quantity of glucose used to rouse the patients was kept at a minimum, and the EKG changes failed to appear. This would argue against the possibility that the effect of the vitamin B_1 was pharmacologic in nature, and indicates that the change was the result of a relative deficiency when the food intake was increased by a vitamin free foodstuff.

Conclusions

Evidence has been presented that certain EKG changes which occur during the course of insulin shock therapy are not due to the administration of insulin, per se, but are due to the fact that large amounts of glucose, a

vitamin free substance, are used to rouse the patients from coma. It seems probable that the large caloric intake free of vitamin B caused a relative insufficiency, and that the EKG changes are due to the vitamin B deficiency.

BIBLIOGRAPHY

1. Romano, N., Mazzei, E. S., and Baila, M. R.: Revista de la Associacion Medica Argentina, **9**: 1175, 1936.
2. De Chatel and Palisa, C.: Klin. Wchschr., **14**: 1784, 1935.
3. Hadorn, W.: Ztschr. f. klin. Med., **130**: 643, 1936.
4. Messinger, E.: Ann. Int. Med., **12**: 853, 1938.
5. Goldman, D.: Arch. Int. Med., **66**: 93, 1940.
6. Barker, P. S., Shrader, E. L., and Ronzoni, E.: Am. Heart. J., **17**: 169, 1939.
7. Milles, G., and Smith, P. W.: Am. Heart J., **14**: 198, 1937.
8. Jolliffe, N., Goodhart, R., Gennis, J., and Cline, J. K.: Am. J. Med. Sc., **198**: 198, 1939.
9. Dustin, C. C., Weyler, H., and Roberts, C. P.: New Eng. J. Med., **220**: 15, 1939.
10. Williams, R. D., Mason, H. L., Wilder, R. M., and Smith, B. F.: Arch. Int. Med., **66**: 785, 1940.
11. Jolliffe, N.: Proc. So. Pacific Sc. Cong., San Francisco, 1940.
12. Sakel, M.: Pharmacological shock treatment of schizophrenia translated by J. Wortis. Nerv. and Ment. Dis. Monographs 62, Wash., D. C., 1938.
13. Voegtlin, C., and Lake, G. C.: Am. J. Physiol., **47**: 558, 1918.
14. Karr, W. G.: Journ. Biol. Chem., **44**: 255, 1920.
15. Cowgill, G. R.: Am. J. Physiol., **57**: 420, 1921.
16. Osborne, T. B., and Mendel, L. B.: J. Biol. Chem., **54**: 739, 1922.
17. Cowgill, G. R., and Klotz, B. H.: Am. J. Physiol., **81**: 470, 1927.
18. Plimmer, R. H. A., Rosedale, J. L., and Raymond, W. H.: Bioch. J., **21**: 913, 1927.
19. Himwich, H. E., Goldfarb, W., and Cowgill, G. R.: Proc. Soc. Exper. Biol. and Med., **28**: 646, 1931.
20. Himwich, H. E., Goldfarb, W., and Cowgill, G. R.: Am. J. Physiol., **99**: 689, 1932.
21. Cowgill, G. R., Rosenberg, H. A., and Rogoff, J.: Am. J. Physiol., **98**: 589: 1931 a.
22. Cowgill, G. R., Rosenberg, H. A., and Rogoff, J.: Am. J. Physiol., **96**: 372, 1931 b.
23. Burack, E., and Cowgill, G. R.: Proc. Soc. Exper. Biol. and Med., **28**: 750, 1931.
24. Sherman, H. C., and Sandels, M. R.: J. Nutrit., **3**: 395, 1931.
25. Street, H. R., Zimmerman, H. M., Cowgill, G. R., Hoff, H. E., and Fox, J. C., Jr.: Yale J. Biol. and Med., **13**: 293, 1941.

THE TREATMENT OF CHILDHOOD SCHIZOPHRENIA BY METRAZOL SHOCK MODIFIED BY B-ERYTHROIDIN[1]

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The present study was undertaken following the work of Rosen, Cameron and Ziegler(1), who in 1940 presented a method for modification of the metrazol seizure by first injecting a solution of beta-erythroidine hydrochloride, a drug having a curare-like action on the body musculature. The method was first tested by these workers in animal experimentation, and proved to reduce the duration and severity of the metrazol seizure. The method had proved safe in the 37 cases treated by these authors, and had prevented fractures of the spine in all cases, as well as simplifying the problem of treatment through alleviation of the severe dread of treatment suffered by the patients.

The value of finding a modified seizure treatment for schizophrenic children was indicated by the fact that two cases treated at Bellevue in 1938 had good social remissions, but severe fractures of the thoracic vertebræ(2). The various observers of schizophrenia in children have all indicated a grave prognosis. Potter and Klein(3) reported a follow-up study of 14 cases, in which 13 had progressively deteriorated, only one maintaining a fair social adjustment. Lurie, Tietz and Hertzman(4) reported one improvement in 13 cases, Grebelskaja reported one in 13(5). Creak(6) reported 14 improvements in 35 cases, but does not distinguish between adolescent and childhood schizophrenia in giving these figures, so that the remission rate in her 9 cases with onset of psychosis before the age of 12 cannot be determined. Since the indication given in the two cases previously treated seemed favorable, we thought it advisable to continue shock treatments in children, providing a means could be found of eliminating fractures, the danger of which seemed increased in children.

[1] From the children's division of the Bellevue Psychiatric Hospital and New York University Medical School.

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Preparation and Action

Beta-erythroidine hydrochloride is one of the newly isolated erythrina alkaloids having a curare-like action. It is obtained in dry powder, sealed in ampoules by reason of its instability in solution and when exposed to air. We utilize a 5 per cent solution, made up with sterile distilled water and sterilized by passing through a Berkfeld filter. A three-week supply is made up at a time, and cultured for aerobic and anaerobic growth before use.

The effect of beta-erythroidin appears to be that of inactivation of acetylcholine at the myoneural junction(7),(8), as well as some central effect producing somnolence. Shortly after the injection is begun, the patient has subjective symptoms of vertigo and shortness of breath, and many patients complain of transient visual disturbances. The facial expression quickly becomes ironed out, and ptosis and dysarthria gradually develop. Deep reflexes are maintained, and there may be a slight increase in pulse rate and fall in blood pressure. The pupillary reaction to light becomes sluggish, then absent, and pupillary inequality is an almost constant finding. Transient hippus and nystagmus often occur. At the point of erythroidin effect, the pupils are fixed or sluggish in reaction to light, unequal, and irregular in outline. Muscle strength as tested by the hand dynamometer falls gradually over the period of injection, and should be tested only once a minute to rule out fatigue effect. At the point of erythroidin effect, the muscle strength measures zero to four pounds, an effect which lasts 3 to 4 minutes, with gradually returning strength from 4 to 8 minutes. Clouding of consciousness is shown by the inability of the patient to count, this inability coming on at approximately half the total dosage. At the time of cessation of injection, the patient can usually respond with his name, but is unable to count or to give any information as to subjective symptoms. He

usually has no memory for the injection of metrazol or the onset of the convulsion, and his dread of treatment concerns the subjective experience of vertigo.

The effect on respiration must be closely observed, since periods of apnea, labored or shallow respiration indicate an unfavorable effect on the respiratory muscles. These symptoms are usually mild, and disappear within a minute if further injection is temporarily withheld. When respirations again become regular the injection can be continued. The effect of erythroidin can be overcome by 1 cc. of prostigmine injected intravenously within two minutes, and this drug should be kept ready for instant injection should the respiratory symptoms become dangerous.

Administration

Treatments are given three times weekly. Breakfast is withheld to avoid vomiting and aspiration of vomitus. The solution is injected slowly, 2 cc. (or 100 mg.) being given at each half-minute interval. If respirations become shallow or labored before dysarthria and weakness occur, the injection is slowed, one minute being allowed to elapse without injection. On the first and second treatments the child is tested for erythroidin effect by determining the degree of ptosis, dysarthria and if cooperation can be secured, the strength of hand and arm muscles as measured by the dynamometer. The point of effectiveness is considered reached when either the dynamometer reading falls to zero or when ptosis, dysarthria and pupillary irregularity appear constant. The dosage thus determined on the first two trials remains constant for the duration of treatment.

Immediately following the erythroidin injection, 2½ to 3 cc. of a 10 per cent solution of metrazol is injected and the convulsion ensues. The modification of the seizure obtained by this method varies with the different subjects, some showing comparatively little movement during the seizure, while others have a convulsion indistinguishable from the usual metrazol convulsion except in strength of muscular contraction. The dose of metrazol should be sufficient to produce a prompt and generalized tonic and clonic convulsion, to avoid a seizure delayed past the period of erythroidine effect or a psychomotor equivalent. The metrazol dosage is not appreciably increased by the erythroidin, as shown by other workers, as well as by our own cases. Two larger boys required 3½ cc. of the metrazol solution, while the 6-year-old girl in this series required only 2 cc.

Results

A total of 155 treatments have been given to the 10 patients in this series. Five boys have had over 20 treatments each, three have had 9 and two, 7. The first patient treated, a stuporous catatonic boy of 13, was given 1 cc. of prostigmine routinely immediately following the injection of metrazol, as had been recommended by the previous workers as a precaution against prolonged apnea. On one occasion the metrazol injection was immediately repeated because of missed convulsion, and a seizure took place after the erythroidin effect had been counteracted by the prostigmin. This boy was examined immediately, since the seizure which occurred had been unmodified, and was found to have a compression fracture of three thoracic vertebræ. Because of the ever-present possibility of delayed seizures, we felt it advisable to omit the injection of prostigmine, which has been done in all subsequent cases.

The other 9 patients treated have had no clinical or roentgenographic evidence of fracture. On two occasions in the subsequent treatments without prostigmine, respirations were delayed following the seizure, but responded to intravenous injection of 1 cc. of prostigmine. As a rule some delay in resumption of respiration can be overcome by the use of artificial respiration for a short period.

The fact that one fracture occurred in this series and was sustained at a time when the patient had lost the erythroidin effect is an additional indication that in the treatment of children some such modification as we have attempted is advisable. Twenty treatments were given to this patient subsequently, without increasing the pathology or producing pain.

Case Material and Clinical Results

The 10 children in this group range in age from 6 to 14. With one exception, the onset of the psychosis occurred before the age of 12. Seven of these children had definite pictures of schizophrenia, with negative pneumo-encephalograms and with no evidence of pre-psychotic mental deficiency. This diagnosis has been maintained subsequent to treatment.

Of the 7 schizophrenic patients, one 13-year-old boy was unimproved after 23 treatments and was transferred to a state hospital. The other 6 have all shown some improvement in social behavior and in ability to do their school work. L. T., a 12-year-old girl with a psychosis of one year duration, has maintained her improvement at home for 6 months, and is progressing well at school, following 5 metrazol treatments. W. P., a 13-year-old boy with a hebephrenic psychosis of two years' duration, improved in behavior and ability to make social contact, but appeared still affectively flat and without drive after 26 treatments. There was no further improvement with 50 insulin shock treatments given subsequently, and he was discharged to his home, where he is making only a fair adjustment in the regular classes at school. S. D., a 10-year-old boy with a psychosis of 6 years' duration, was given metrazol treatments after a full course of insulin treatments had failed to improve his condition. He showed marked social improvement, took an interest in school and showed better integration of intellectual functions and emotional response than at any time in the course of his illness. He is now making a fairly good adaptation in ungraded classes. J. J., a 13-year-old boy with a sudden onset of excitement and overactivity one month prior to treatment, showed reduction in activity and mood swings, but retained his delusions, hallucinations and disturbance in thought processes in part. He was given 9 metrazol treatments, then 18 insulin shocks, which produced a complete remission. H. S., a stuporous catatonic boy of 14, with symptoms dating to the eleventh year, was improved in his social adaptation on the ward and in school, and showed a gain in ability and interest in learning. Because of continued negativism, he was given 18 insulin treatments, but discharged to his home when these failed to add to the improvement shown after metrazol. He is adjusting well in the adjustment class at school. B. G., a 12-year-old boy with compulsive features and schizophrenia of one year's duration, has shown social improvement following 7 treatments, but is still receiving intensive psychotherapy.

Two children, a boy of 13 and a girl of 6, in the differential diagnosis of whom schizophrenia was seriously considered, showed a hysterical mutism superimposed on borderline intelligence. This condition became amenable to treatment by other methods after the initial improvement on metrazol therapy. One boy of 10 was given treatment because he showed a clinical picture of schizophrenia, although encephalographic and electroencephalographic studies showed a moderate amount of cortical atrophy unilaterally, probably on the basis of a chronic mastoid infection which had extended to the brain. This boy showed no improvement after 22 treatments.

Summary and Conclusions

The method of modification of the metrazol seizure by beta-erythroidin hydrochloride used by other investigators is here applied to the treatment of schizophrenic children, in whom the incidence of fractures sustained by unmodified metrazol convulsions appears high.

The physiological effect of the drug is discussed in its application to the diminution of strength of muscular contraction, and modification of the convulsion.

Modification of the seizures has resulted in preventing fractures in 9 of 10 cases, the tenth patient sustaining a fracture through a delayed, unmodified seizure. It is suggested that by avoidance of the use of prostigmine, the danger of this complication may be decreased. The safety of this method of modification is assured by careful technique of administration.

Clinical results show that 8 of 9 schizophrenic children treated (including two previously treated by unmodified shock) have shown improvement in response to metrazol therapy. Final evaluation of the efficacy of

metrazol treatment in these cases must necessarily await further observations, to determine whether patients treated by this method show a better remission rate than the low figures for spontaneous remission indicate.

BIBLIOGRAPHY

1. Rosen, S. R., Cameron, D. E., and Ziegler, J. B.: The prevention of metrazol fractures by beta-erythroidin hydrochloride. Psych. Quart., **14**: 477, July, 1940.

2. Polatin, P., Friedman, M. M., Harris, M. M., and Horwitz, W. A.: Vertebral fractures produced by metrazol-induced convulsions. J. A. M. A., **112**: 1685, April, 1939.

3. Potter, H. W., and Klein, H. R.: An evaluation of the treatment of problem children as determined by a follow-up study. Am. J. Psychiat., **94**: 681, Nov., 1937.

4. Lurie, L. A., Tietz, E. B., and Hertzman, J.: Functional psychoses in children. Am. J. Psychiat., **92**: 1169, Mar., 1936.

5. Grebelskaya-Albataz, E.: Zur Klinik der Schizophrenie des frühen Kindesalters. Schweiz. Arch. f. Neurol. u. Psychiat., **34**: 244, 1934; **35**: 30, 1935.

6. Creak, M.: Psychoses in children. Proc. Roy. Soc. Med., **31**: 519, March, 1938.

7. Folkers, K., and Koniuszy, F.: Erythrina alkaloids. IV. Alpha and beta erythroidine. Abstracts of papers, American Chemical Society, Baltimore, April, 1939.

8. Rosen, S. R., and Borenstein, M. V.: Psychophysiological action of beta-erythroidin hydrochloride. Psychiat. Quart., **15**: 163, Jan., 1941.

THE EFFECT OF CONVULSIVE TREATMENT ON MEMORY[1]

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It has been the impression of investigators using artificially induced convulsions in the therapy of the psychoses that memory impairment may occur as a result of this form of treatment. Patients often complain of a memory loss following an induced convulsion, and casual observations and questioning of such patients have given credence to the opinion that some organic impairment of memory may result from convulsive treatment.

The present study was undertaken to determine, if possible, whether any quantitatively measurable memory deficiency results from a course of convulsive therapy.

Platner(1) found a severe amnestic syndrome in four of seven patients in remission following combined insulin and metrazol treatment. No tests were made preceding the therapy.

Tooth and Blackburn(2) tested sixteen metrazol treated patients with a modified form of the Babcock test, comparing the results with the pre-psychotic intelligence level as estimated from the vocabulary score. Nine of the subjects complained of memory difficulties, and the test results showed an organic impairment of intelligence in eight of them.

Ziskind(3) and collaborators studied the effect of metrazol on recent learning. The task was that of transcription of a nonsense syllable code. After practice there was a one week interval during which the subjects, six patients including two with chronic encephalitis, one with a manic-depressive condition, one with involutional melancholia and two with schizophrenia, were given two to three metrazol injections, after which they were retested. Then, using the same group as a control, and employing an alternate form of test, no metrazol was given during the one week interval. Scores were 27.8 per cent lower for patients with metrazol than without. A second control group of four normals, one encephalitic and one recovered hypomanic patient, given no metrazol, showed no loss when retested.

Wittman's(4) results, based on larger groups of patients tested with a battery of tests, contradict those cited above. As a part of her study she tested twenty patients approximately twenty-four hours after each metrazol treatment. A composite graph for the group as a whole showed a gradual rise through the ninth treatment and then a slight dropping off. This slight deficit toward the end of treatment was explained by the fact that some of the patients who showed good improvement were considered in remission and their treatment was discontinued, and that old chronic cases showing little improvement were continued on treatment, their relatively low scores thus weighting the results of the last part of the treatment period.

In a later study Wittman and Russell(5) stated that "no substantiation of memory defect following therapy has been found in this study." They add that if such memory defect occurs it is more than compensated for, so far as test results show by improvement in interest, attention and social responsiveness.

Material and Method

Ten psychotic patients, nine classified as schizophrenic and one as manic-depressive, were each given a series of six tests before, during and after grand mal seizures induced electrically in four instances and chemically in six, either with metrazol, picrotoxin or a combination of these drugs. The first series of tests was given one day before treatment was begun, the second series the day follow-

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ing the fifth or sixth treatment, and the third series at the end of the course of treatment. The total number of treatments ranged from ten to sixteen, with an average of 13.5.

The tests included four standard tests for immediate memory, one test for recent memory and one "life situation" test involving recent recall.

The four standard tests of immediate memory included memory for two designs; digits; reading and report of a paragraph read; and report of a paragraph read by the examiner.

With the exception of the series of digits, alternative forms of all the other tests were used at the second and third examination, to eliminate practice effects.

For a life situation test, the patient after sitting down to begin the examination was told, "Go to the nurses' office and call Miss W." At the second examination the test was varied as follows, "Go to the nurses' office and get a pencil," and at the third examination, "Go to the dayroom and bring a chair."

After the patient had returned from carrying out the preliminary request, the standard tests were applied after which the patient was asked, "What did I ask you to do before we began these tests?" The reply served as a measure of recent memory.

As a second measure of recent recall, the patient was asked, "What was the first test I asked you to do?"

Results

According to Table 1, there was an increase in the average scores on the four standard memory tests when the responses during the course of therapy were compared with those preceding the beginning of treatment. This increase, however, was insignificant except in one test—report of a paragraph heard—but the fact that there was slight improvement in all tests suggests that the treatments had a favorable effect in that attention and concentration improved, compared with the efficacy of these processes before treatment.

At the close of treatment memory for designs and digits had returned to the initial level, there was slight improvement in the report of a passage read, and the improvement in the report of a paragraph heard was sustained.

TABLE 1

Average Scores of Ten Patients on Four Standard Memory Tests Before, During and After Shock Therapy

Tests	Designs. No. correct	Digits. No. correct	Reading report. Items correct	Report of paragraph heard. Items correct
Before treatment ..	1.5	6.7	7.1	6.1
During treatment ..	1.9	7.0	8.0	10.6
After treatment ...	1.5	6.7	9.7	10.5

Table 2 shows that there was no effect of treatment upon the response in the life situation test. Before treatment seven patients responded correctly to this test, recalling correctly the preliminary request that had been made of them. During treatment six patients responded correctly, and following treatment, seven patients.

Table 2 shows further that when asked to recall the nature of the first standard test given, there was no significant difference in the number of patients responding correctly before, during or after therapy.

Summary

Ten patients, nine classified as schizophrenic and one as manic-depressive, were

TABLE 2

Reactions of Ten Patients to Two Tests of Recent Memory Before, During and After Shock Therapy

	Recall of preliminary request			Recall of first test		
	Recall			Recall		
Tests	Correct. No. pts.	Incorrect. No. pts.	Tests not given. No. pts.	Correct. No. pts.	Incorrect. No. pts.	Tests not given. No. pts.
Before treatment	7	3	0	9	1	0
During treatment	6	2	2	8	1	1
After treatment	7	2	1	10	0	0

given standard and other memory tests before, during and after a full course of from ten to sixteen grand mal convulsions induced electrically in four instances and chemically in six.

The tests were given one day before treatment was begun, the day following the fifth or sixth treatment, and at the end of the course of treatment.

The induced grand mal seizures had no significant effect upon immediate or recent memory as tested by standard and other memory tests.

BIBLIOGRAPHY

1. Plattner, P.: Amnestic syndrome after insulin and metrazol treatment. Z. Neurol. u. Psychiat., **162**: 728-740, 1938.

2. Tooth, G., and Blackburn, J. M.: Disturbance of memory after convulsion treatment. Lancet, **237**: 17-20, 1939.

3. Ziskind, E., Loken, R., and Gengerelli, J. A.: Effect of metrazol on recent learning. Proc. Soc. Exp. Biol., **43**: 64-65, 1940.

4. Wittman, P.: A psychological study of the mental confusion following metrazol therapy. Elgin Papers, **3**: 67-71, 1939.

5. Wittman, M. P., and Russell, J. T.: Mental efficiency levels before and after shock therapy. Elgin Papers, **4**: 70-81, 1941.

ELECTROENCEPHALOGRAPHIC STUDIES IN ORGANIC PSYCHOSES [1]

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Brain wave studies were reported in many mental disorders but many more investigations will be necessary before we are able to standardize our records. In comparison to gross neurological disorders, the findings in mental diseases of organic origin are not as clear cut or uniform as desired, probably because the structural impairment of the brain is more subtle, and for that reason the electrical changes are not as clearly discernible. Some controversy is due to the fact that at times authors dealing with organic diseases of the brain did not differentiate clearly between persons who had only neurological manifestations and patients who had also mental changes. For instance, in cerebral arteriosclerosis or neurosyphilis it will be essential to distinguish between conditions which show some focal pathology with intact mentality against cases in which a rather profound mental disturbance is present. It is also necessary to point out that a routine electroencephalographic examination of all patients with organic psychosis is not possible because many patients are uncooperative. In other words, all the cases examined were more or less selected, and this fact probably influenced the statistical appraisal of the records.

In this study we examined only patients suffering from the most common organic psychoses. We shall take up first the observations made in general paresis.

Berger who examined 20 patients with general paresis found that a relationship existed between the degree of corticoelectric involvement and the severity of the dementia. Among his cases he found some normal records but most of them showed irregularities in frequencies and amplitude, and often a depression of the alpha activity was present. In recent cases Berger found a somewhat irregular acceleration of the brain potentials which he interpreted as a shortening of alpha waves to forty to sixty milliseconds, and assumed that they are symptoms of irritation similar to those observed in an excitation phase of avertin narcosis. Especially, patients with only mild mental symptoms tended to display this abnormally fast activity. Finlay made similar observations in his series, composed entirely of early cases. Patients with mild symptoms tended to show abnormally fast activities. The more severe the mental symptoms, the more likely the patient was to show many slow waves. Berger also found a marked lack of similarity between the homologous areas and in some of his patients these dissimilarities were the only abnormality recorded.

We examined *17 cases of general paresis,* 12 male and 5 female patients. All patients showed intellectual impairment, memory defects and disorientation. All had a characteristic serology. Only one of the patients could be considered an early case. In this patient the duration of the psychosis was about six months, in the others it varied from two to ten years. With the exception of the recent case, all received fever treatment, tryparsamide or other anti-luetic therapy at one time or another. Unfortunately we were unable to examine a sufficient number of early cases for comparison.

Our EEG records are characterized by the following findings. Most common was the appearance of slow waves from three to six per second. In some cases these waves had a high amplitude. In others, the amplitude was not noticeably changed. Only one of the patients showed frequent waves of eighteen to twenty per second. In 4 of our cases the EEG very much resembled records obtained in so-called psychomotor epilepsy. In 2 of these patients occasional emotional outbursts were noted but without the epileptic characteristic of amnesia for these attacks. In the other 2 patients, however, no such emotional changes were present. From the 12 cases,

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Virginia, May 5-9, 1941.

From the Manhattan State Hospital, Ward's Island, N. Y., and the department of psychology, Graduate School, Fordham University, N. Y.

3 had epileptiform attacks mentioned in the history. Only one of them showed an EEG resembling epilepsy, having high amplitude spikes at random. None of our patients showed records resembling the petit mal activity, the typical spike and dome formation. In 6 of our patients differences between both sides were noted. In 2 the right side, in 4 the left frontal record showed higher amplitude. By a retest this condition remained constant, so that we assume that they are not artefacts, but that the paretic process influenced differently the electrical activity of the brain in the two hemispheres. In 4 patients the slow waves appeared predominately in the frontal leads, in other patients the frontal parietal and occipital leads all showed pathological records, and it was not possible to demonstrate that the frontal lobe showed more impairment than the others. These findings we mention only because many of the autopsy reports on paretics stress the issue that the cortex of the frontal lobe is more involved than other parts of the brain. A correlation between these EEG findings and autopsy material has to be worked out in the future. With the exception of one recent case, all other patients showed pathological findings. Certain patients had clearcut slow waves, 3 showed borderline records, with findings similar to those in deteriorated schizophrenics, an irregular disorganized pattern with occasional slowing down of the alpha activity to seven per second. One of the patients showed choppy waves. In our findings there is a relative correlation between the severity of the dementia and the EEG findings. These cases which showed profound deterioration showed more often characteristic slow waves. Patients with a slight dementia had a much better organized EEG even though they were not quite normal. In our single early case which showed only slight mental abnormality, the EEG was normal. These findings did not correspond with the observations made by Berger who reported abnormal EEG's in acute cases, but did not find abnormal EEG's in chronic paretics after they received malarial treatment. He found that after the disease was arrested, even though the patient had a residual mental defect, the abnormalities in the EEG disappeared. As mentioned before, our patients are chronically deteriorated paretics who had fever treatment which probably arrested to some extent the further development of the mental process, but was unsuccessful in restoring the patient's mental health. We found in these cases the above recorded abnormal EEG findings. It will be necessary to study the EEG on a larger number of paretics, paying attention not only to the diagnosis, but also to the duration of the psychosis, to the different clinical pictures treatment, etc. If such a program is carried out we may be able to clarify some of these contradictory observations and correlate the EEG's with the clinical findings.

We examined *15 senile patients,* 10 male and 5 female. All of these patients had marked mental impairment. Most of them were quite deteriorated, had memory defects and were disoriented. Naturally, the degree of mental derangement varied; some patients showed in addition to the above mentioned mental pathology, intermittent states of confusion. The EEG records obtained are not uniform. All of the patients with the exception of two in which the mental impairment was not very profound, showed a pathological wave pattern. In the majority there was a slow alpha activity averaging five to seven waves per second. In 4 cases the alpha frequency went down to about four per second. We were impressed by the fact that many of our patients had a rather low voltage activity; and even in those cases in which we saw slow waves, they were generally not as high in amplitude as in cases of general paresis or alcoholic psychosis, although occasional high voltage slow waves occurred. Abnormally fast activity was only found in 2 patients, but even in those cases fast activity was superimposed on four to six per second alpha activity. In senile psychosis we rarely observed differences of the EEG in both hemispheres. These differences in the activity of the homologous areas are seemingly not as common in senile psychosis as in general paresis. In the 2 cases who showed a mental deterioration only to a mild degree, there was a slowing of the frequency to about six to seven per second, and the pattern was rather disorganized. The clinical picture could not be correlated with the EEG

findings, with the exception that seemingly these patients that showed marked confusion were most apt to have a slow wave activity. In patients with simple deterioration, with no marked confusion, slow waves were not as often seen.

We were able to examine *37 patients with psychosis with cerebral arteriosclerosis*, 20 females and 17 males. Thirteen of these patients had a neurological involvement besides being psychotic, most of them having hemiplegias. In this series we were fortunate to have a very varied clinical material, ranging from acute or mild psychosis to profound arteriosclerotic deterioration of many years standing. We differentiated, furthermore, between patients who showed neurological signs indicating focal lesions and those in whom only a mental impairment was present without any neurological signs. In the cases in which the psychosis was of recent origin slow waves from two to five per second were found, especially in those with marked confusion. In the other acute cases showing only some memory defect and mild disorientation but otherwise well preserved psychic functions, the record appeared to be normal with the exception of a few cases in which a slowing down of the alpha frequency to about six to seven per second was found. In the chronically deteriorated arteriosclerotic patients the majority displayed slow wave patterns. We encountered, however, about 8 patients with arteriosclerotic deterioration of long standing with seemingly normal electric activity of the brain, the wave patterns being the same as seen in old people without any psychosis. Patients with hemiplegia often displayed slow waves on the side of the lesion, the other hemisphere having a normal wave frequency and amplitude. In those cases, however, in which a rather marked mental impairment was present in addition to the hemiplegia, slow waves appeared diffusely all over the cortex. We attempted to localize the focus of the slow activity in cases of hemiplegia, but did not succeed in many cases, probably because of the subcortical localization of the lesion. It is surprising that we did not find in our fairly large series of arteriosclerotic patients, records which resembled epilepsy. None of our patients, however, so far as we know had epileptic manifestations due to arteriosclerosis. This would be in correlation with the EEG findings. In some patients we found diffuse impairment of electrical activity in all leads. In other patients the severity of the involvement varied. Bilateral differences were also noticed in arteriosclerotic patients similar to those seen in general paretics. It is possible that the arteriosclerotic process being more patchy and not so diffuse as the senile changes, more often produces different EEG's in the homologous areas. In our material we did not obtain different records in patients who had hypertension as compared with others who did not, with the exception that in some patients with marked confusional states and high blood pressure, we saw more often slow waves of two to four per second during the confusional state. A detailed report of our findings in arteriosclerotic psychosis will appear elsewhere, and in the foregoing we have confined ourselves to a few pertinent observations.

We examined *16 patients suffering from alcoholic psychosis*. Ten of these had a Korsakoff psychosis, 2 had a hallucinosis, 2 had an alcoholic psychosis with paranoid trend and 2 patients suffered from chronic alcoholism without any noticeable intellectual or emotional impairment. The patients who suffered from chronic alcoholism and those with alcoholic hallucinosis and paranoid trends had normal EEG's. Two Korsakoff patients showed a normal record with rather high amplitude waves, even though they had quite an impressive mental impairment. The other Korsakoff cases all displayed slow waves from three to six per second. These slow alpha waves were most prominent in the fronto-occipital and fronto-motor leads. Differences of both sides were not seen in our series. One of the Korsakoff patients who had epileptic attacks showed slow waves but they were not characteristic of grand mal epilepsy. Had we not known from the anamnesis that he had epileptic attacks we should have been able to diagnose only an organic process, without suspecting the presence of epileptic attacks.

All patients examined were routinely hyperventilated. We found hyperventilation helpful not only in cases of epilepsy but in other conditions as well. In many cases the

slow wave pattern became more clear after hyperventilation, and we think that it should be used as a routine procedure in all electroencephalographic studies. We also tried to influence the wave pattern in some patients by injecting subconvulsive doses of metrazol, one or two cc.'s intravenously, and gave the patients sodium amytal in doses ranging from one grain to two grains both orally and intra-muscularly. We did not see much change in the wave pattern after using these drugs, which is in agreement with the findings reported in the literature. These studies, however, still continue and will be reported later.

We examined *60 schizophrenic patients,* to compare their records with those obtained in the organic psychoses. We made the following observations up to date. Slow alpha waves, two to five per second which were present in a great number of cases suffering from organic psychosis were not seen in clear cut cases, acute or chronic, of schizophrenia. Disorganization of pattern, slowing down of the alpha activity to seven per second, alternating fast and slow activity, however, was seen in cases of organic psychosis as well as in schizophrenia. Seemingly there are a number of patients with borderline normal encephalograms in whom we are unable to distinguish between an organic psychosis and schizophrenia; and this is regrettable because the differential diagnosis between these two conditions comes up rather frequently.

Conclusions

Some correlation exists between the EEG findings and the clinical status of the patient in cases of general paresis, senile psychosis, psychosis with cerebral arteriosclerosis and alcoholic psychosis, Korsakoff type. This relationship is by no means an absolute one. There are cases, acute as well as chronic, in which clinically the patient shows psychotic manifestations and the EEG is normal. In acute cases of organic psychosis where the mental disorder develops rather rapidly, often slow waves can be observed, especially in patients who suffer from marked confusional states, and in cases in which the consciousness is narrowed. In acute cases with only moderate mental impairment, the EEG findings are often normal or borderline. In chronic cases some parallelism exists between the degree of deterioration and the EEG findings. Slow waves can be demonstrated in many cases. They are, however, patients of long standing mental deterioration who did not show noticeable corticoelectric changes. It is possible that if an organic process is very slow in developing, findings are missing for some time because the brain has had an opportunity to adapt itself to the damage. Another possibility is that in some of these cases the structural changes are not so much cortical but are localized in sub-cortical associative areas, producing inconspicuous EEG findings. We found that the electroencephalogram has a distinct diagnostic value in organic psychoses if definite slow waves from one to five per second were present, because in such cases a definite mental impairment was demonstrable, but if the electroencephalogram was normal this did not exclude the presence of an organic psychosis. Due to the fact that no absolute correlation exists between the electroencephalographic findings and clinical observations, the diagnostic value of this method is limited at present until we shall be able to work out a closer correlation between organic psychotic processes and corticoelectric phenomena. We agree fully with the statement made by P. A. Davis and H. Davis that: "Although the psychotic individual cannot be recognized by his EEG, nevertheless, as a group the psychotics have a significantly larger percentage of abnormalities in their EEG's than do normals." This is especially true of patients suffering from the organic type of mental disorders.

BIBLIOGRAPHY

1. Berger, H.: Ueber das Elektrenkephalogram des Menschen III. Arch f. Psychiat., **94**: 16-60, 1931.

2. Berger, H.: Ibid. V. Arch. f. Psychiat., **98**: 232-251, 1933.

3. Berger, H.: Ibid. VI. Arch. f. Psychiat., **99**: 555-574, 1933.

4. Berger, H.: Ibid. VII. Arch. f. Psychiat., **100**: 301-320, 1933.

5. Berger, H.: Ibid. XI. Arch. f. Psychiat., **104**: 678-689, 1936.

6. Gibbs, Frederick A., and Gibbs, Ernal: Atlas of electroencephalography, 1941.

7. Lemere, F.: Effects on electroencephalogram of various agents used in treating schizophrenia. J. Neurophysiol., **1**: 590-595, 1938.

8. Drohocki, Z., and Drohocka, J.: Etude electroencephalographique de la localisation pharmacologique des narcotiques. Arch. internat. de pharmacodyn. et de therap., **62**: 265-280, 1939.

9. Drohocki, Z., and Drohocka, J.: La modification caractéristique de l'electrospectogramme par la narcose. Compt. rend. Soc. de biol., **132**: 64-69, 1939.

10. Davis, P. A., and Davis, H.: The electroencephalograms of psychotic patients. Am. J. Psychiat., **95**: 1007-1025, 1939.

11. Jasper, H. H.: Electrical signs of cortical activity. Psychol. Bull., **34**: 411-481, 1937.

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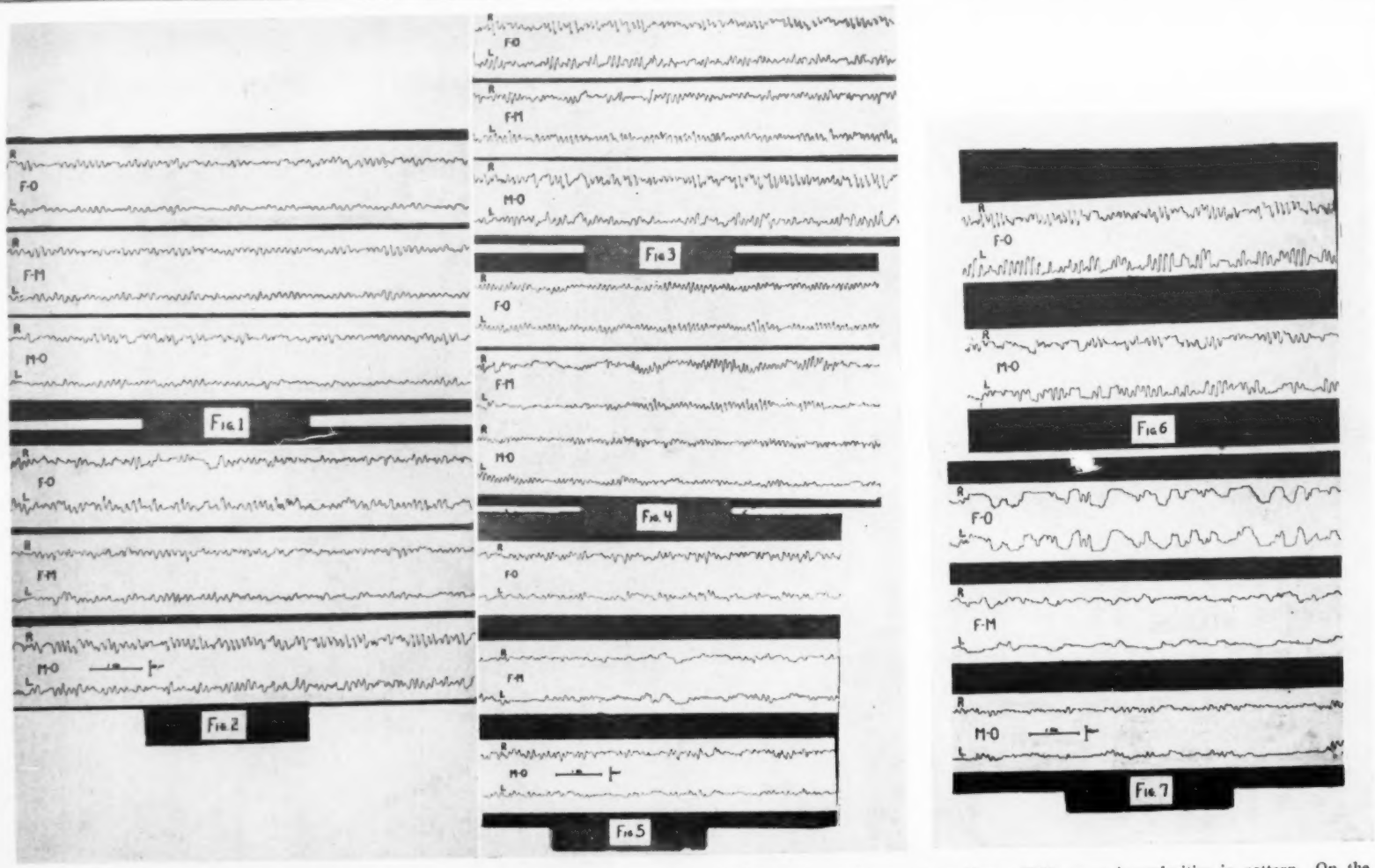

FIG. 1.—General paretic, deteriorated. EEG fairly normal. No relationship between the severity of mental impairment and EEG. Slight difference between sides.

FIG. 2.—Cerebral arteriosclerosis with no focal signs. Dementia of medium degree. EEG record borderline. Some irregularities in pattern. Occasional tendency to squaring of waves.

FIG. 3.—Alcoholic psychosis, Korsakoff Type with deterioration but no focal neurological signs. EEG shows high amplitude waves, fairly well organized pattern with occasional slow waves interspersed. Tendency to square waves. EEG does not show severity of the mental impairment.

FIG. 4.—Alcoholic psychosis, hallucinosis. Schizophrenic type with many auditory hallucinations and persecutory ideas. EEG: some irregularities in pattern. On the whole, normal record.

FIG. 5.—General paretic, deteriorated. EEG: irregular pattern. Slow waves interspersed especially in the fronto-occipital and fronto-motor leads.

FIG. 6.—Cerebral arteriosclerosis with confusion. High amplitude activity. Frequency slowed. A few slow potentials seen. Slight difference between right and left side.

FIG. 7.—Alcoholic psychosis, Korsakoff Type. Marked confusion. No neurological signs. EEG: slow waves 2-3 per second, most prominent in the fronto-occipital lead. Conformity of EEG with degree of mental derangement.

STUDIES ON THE CORPUS CALLOSUM

VIII. The Effects of Partial and Complete Section of the Corpus Callosum on Psychopathic Epileptics [1]

By ANDREW J. E. AKELAITIS, M.D., Rochester, N. Y.

In a previous paper(1) a psychobiological study of ten epileptics before and after partial and complete section of the corpus callosum was reported. Personality changes were observed in only two patients and in each of these evidence of cerebral damage post-operatively was found.

In view of the recent interest in the neurosurgical therapy of the various reaction types (Moniz(2) Freeman and Watts(3), Lyerly(4), and others), it was deemed advisable to report the effects of division of the corpus callosum on the behavior of epileptics with psychopathic traits. From a group of twenty-four epileptics in whom the corpus callosum has been sectioned in variable degree by Dr. W. P. Van Wagenen(5), four patients have been selected for study because of their abnormal behavior before operation. It must be emphasized that the operative procedure was not performed with the intention of remedying the psychopathy. Detailed psychological studies, including psychometric tests were made by Dr. Frances H. Parsons(6). Electroencephalographic studies were performed by Drs. John B. Hursh and Carl Lendgren.

CASE REPORTS

I. Patients with "Psychic" Equivalents (Cases 1 and 2)

Case 1.—Convulsions since the age of 10; psychomotor attacks, marked personality changes and mental deterioration since the age of 18. Several admissions to psychopathic hospitals. *Partial section of corpus callosum.* Recurrence of attacks. *Complete section of corpus callosum.* Convulsions with psychomotor attacks continued requiring institutionalization.

E. J. B., a single, white woman, aged 24, was admitted to the Rochester Municipal Hospital March 11, 1939; Hospital Unit No. 33354. Since the age of 10 she has been subject to grand-mal and petit-mal seizures. At the age of 18 psychomotor attacks began and since then marked personality changes and mental deterioration have occurred. The duration of these have been variable and were usually terminated by a convulsion. In these attacks she becomes confused, combative, untidy, delusional and hallucinated. She has been in several institutions since 1933.

Family history reveals that father deserted family when patient was 17 months old and she was brought up by the maternal grandmother who died in 1928. As a child the patient was rejected by the mother and antagonism between the two is still evident. The patient has lived since 1928 with her mother, an excitable emotionally immature woman.

Personal History.—Birth and early development normal. She was a nervous child subject to frequent temper tantrums, and enuresis persisted to the age of 9. School progress was slow but she finished three and a half years of high school at 19.

Personality.—During early adolescence she was an outgoing individual. Since the age of 18 she has become increasingly seclusive and asocial.

Physical status revealed a few carious teeth, perforation of the left ear and an acneiform eruption. The neurologic examination was entirely negative. She was right-eyed and right-footed. As a child she used her left hand in eating and writing but at present she uses her right hand in skillful tasks.

Preoperative Psychiatric Status.—She was a dull, immature girl with psychomotor retardation and a slow monotonous voice. She talked in a very circumstantial manner, losing herself in minute details. Mood was one of apathy, frequently interrupted by irritability. Sensorium, mental capacity and intellect were impaired. The Binet level was 11 years.

Laboratory Studies.—Electroencephalograms disclosed persistent delta waves (3-4 per second) over the entire calvarium. Detailed laboratory studies were otherwise normal.

First Operation.—On March 18, 1939, a right fronto-parietal craniotomy was performed and the *body and posterior half of the genu of the corpus callosum* was sectioned.

Course.—She convalesced rapidly and showed no change in neurologic or psychiatric status. The

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Va., May 5-9, 1941.

From the department of medicine, University of Rochester School of Medicine and Dentistry, and the clinics of the Strong Memorial and Rochester Municipal Hospitals.

Binet level, one month postoperatively, was 10 years, 4 mos. On March 30 she had a grand-mal seizure and it was decided to section the corpus callosum completely.

Second Operation.—On April 24 the *corpus callosum was sectioned completely* except for a few possible fibers in the tip of the splenium.

Course.—During the first two days she was critically ill but subsequently she convalesced satisfactorily. The neurologic and psychiatric status remained unchanged. The Binet level was 10 years, 7 months. She was discharged May 16, 1939.

Subsequent Course.—She continued to have seizures but the mother remarked on Eleanor's improved behavior. However, in August 1939 she began to show confusion and irritability and ideas of persecution became so marked that she was readmitted, for the sixth time, to the psychopathic division of the Rochester Municipal Hospital, October 25, 1939. Throughout her four-day stay she was confused, noisy, untidy and at times combative. Her behavior was influenced by her delusions of persecution and hallucinations.

She was committed to Rochester State Hospital November 1, 1939 and has remained there. She has continued to have seizures with occasional psychomotor attacks. These latter are similar to those described before operation. She has been seen on several occasions during her quieter periods and the findings are essentially the same as before operation. On May 20, 1940, the Binet level was 10 years, 7 months.

CASE 2.—Convulsions since the age of 26; several psychomotor attacks (furor states), one of which required institutionalization. *Partial section of corpus callosum.* Convulsions and psychomotor attacks have continued.

C. N., a single, white, former school teacher, aged 36, was admitted to the Strong Memorial Hospital March 23, 1939; Hospital Unit No. 151191. Convulsions began 10 years ago shortly after the death of her room-mate from pneumonia. There have been four episodes of furor, the last one occurring in 1938, requiring institutionalization. In this attack she was excited, combative and markedly erotic, verbalizing freely on religious and sexual subjects. This attack lasted two weeks.

Family History.—The father divorced the mother when patient was one year old. The mother is an irritable, domineering woman who has always rejected the patient. An older sister, a school-teacher, is an onychophagist.

Personal History.—Birth and early development were normal. At 14 she was shocked to discover her mother's husband was not her father. She has two bachelor degrees which she obtained in 1925 and in 1933. She has not taught since 1936. Psychosexual life has been disappointing; her only serious love affair in 1934 ended in the discovery that her lover was a married man.

Personality.—She was a sensitive, retiring person with many feelings of inferiority.

Physical status revealed a saccular type of bronchiectasis in the left lung. The neurologic status was normal. She was right-handed, right-footed and right-eyed.

Psychiatric Status.—She was an apprehensive woman with whom rapport was difficult to establish satisfactorily. Mood was one of depression and mild agitation. Sensorium, mental capacity and intellect were well-preserved. The Binet level was 17 years, 9 months.

Laboratory studies were not remarkable except for electroencephalographic studies which revealed immediate development of delta waves upon hyperventilation.

Operation.—On April 4, 1939, a right fronto-parietal craniotomy was performed and the *body and genu of the corpus callosum* was divided.

Course.—For the first three days she was friendly, talkative and alert. On April 7 she became depressed, expressing the fear that the incontinence of urine and fæces of the night before would be a permanent difficulty. On April 9 she had Jacksonian seizures involving each side alternately. No loss of consciousness occurred. She was placed on 0.5 gm. phenobarbital daily. Except for psychomotor retardation and depression which she attributed in some degree to the heavy sedation, the sensorium, mental capacity and intellect showed little change. The Binet level remained at 17 years, 9 months. Neurologic examination on date of discharge May 3, revealed a slight difficulty in the left hand when performing finer movements.

Subsequent Course.—She was followed intensively and no change was noted by examiners or family. She continued to have petit-mal attacks and occasional transitory episodes in which she was confused and expressed ideas of reference. During the winter of 1939-40 she studied bookkeeping and typing and showed average progress.

A psychotic equivalent state which lasted three weeks occurred in June, 1940. This was preceded by several "fainting" attacks associated with confusion, apprehensiveness, ideas of persecution, and fears of imminent death. She was admitted to the psychopathic division July 4 complaining of somatic and olfactory hallucinations. She continued in a variable state of clouded consciousness, misidentified people, thought she was in a house of prostitution, expressed fears of death because her brain was "drying up" or her body was "evaporating." She finally cleared July 18, 1940.

II. PATIENTS WITH PSYCHONEUROTIC SYMPTOMATOLOGY (CASES 3 AND 4)

CASE 3.—Grand-mal, petit-mal, and stereotyped "hysterical" attacks since the age of 37; resection of the anterior two-thirds of the right temporal lobe because of a fibrillary astrocytoma at the age of 41. Following

lobectomy she has remained at home and has assumed a chronic invalid rôle. *Partial section of corpus callosum.* Attacks have become less frequent. The chronic invalidism was accentuated temporarily but subsequently she returned to part-time work.

E. B., a former secretary, single, white woman, aged 43, was admitted to the Strong Memorial Hospital, April 17, 1939; Hospital Unit No. 122883. Shortly after a disappointment in a love affair she had a grand mal seizure in 1933. Since then she has been subject to frequent seizures of three types: grand-mal, petit mal and "hysterical" attacks. In the latter she suddenly sits up, reaches for a glass of water, lies down and becomes rigid for a minute or two. In March 1937 the anterior two-thirds of the right temporal lobe containing a fibrillary astrocytoma was resected. Since then she has assumed a chronic invalid reaction rôle and attacks have continued.

Family History.—Patient lives with her widowed invalid mother, aged 85, and a sister, aged 47, who through her income as a teacher supports the mother and patient.

Personal History.—Birth and early development normal. She obtained an A.B. degree at 23. She had worked as a secretary until 1937, the last two years (1936-37) as a social secretary. Family relationships have always been close.

Personality.—She has always been a reticent, shy individual, interested in music, reading and horticulture. In the past two years she has become very interested in cross-word puzzles probably as a relief from her boring existence.

Physical and neurologic status was normal. She was right-handed, right-footed and right-eyed.

Psychiatric Status.—Except for a mild degree of apathy this was not remarkable. The Binet level was 18 years.

Laboratory Studies.—These were not remarkable.

Operation.—On April 21, 1939 a right craniotomy was performed and the *corpus callosum was sectioned from the rostrum posteriorly to the point where the fornix reaches the corpus callosum.*

Course.—She convalesced very quickly and within three days post-operatively she was doing cross-word puzzles and reading newspapers and magazines. No change in neurologic or psychiatric status was evident. The Binet level was 17 years, 4 months, two weeks after operation.

Subsequent Course.—She has continued to have the three types of seizures. She sent a monthly report of her progress and the following letter written January 12, 1940 (nine months after operation) describes her invalid reaction very well.

"I survived the holidays beautifully and managed to do quite a bit this last month of 1939.

"In reviewing my month's record I attended a tea and the Book Fair on the 2nd and had a tooth filled on the 4th. On the 20th I went to a neighborhood hair-dresser all by myself, etc."

She has spontaneously complained of a lack of initiative—"I have to push myself," and "only on rare occasions do I have spontaneity."

The mother died in February, 1940; the patient "seemed to bear up wonderfully well." The patient's explanation was "I loved my mother but I could not help but feel that she would never get well and it seemed best for her to die as she did. I must admit that I was more affected when my father died twelve years ago."

I had several informal psychotherapeutic sessions with her and was surprised at her insight. A discussion of the precipitating factors of her seizures presented itself and she observed that fear and boredom were important etiological agents. "Certain people and their conversation bore me and I may have an attack. Is this an attempt on my part to escape an unpleasant reality situation?" In September 1940 she expressed the desire to go back to work as a social secretary. She was encouraged to do so and since October has worked successfully. In a letter she says: "I can't tell you what a difference this has made with me, just to feel useful again. I seem like a different person to myself at least."

CASE 4.—Seizures since the age of 7 coincident with signs of hypopituitarism. At 15 onset of obsessive-compulsive states and episodic suicidal and combative tendencies. *Partial section of corpus callosum.* Amelioration of obsessive-compulsive behavior, more adaptable even though seizures continue with less frequency. One attempt at suicide.

F. P., an Italian lad, aged 18, was admitted to the Rochester Municipal Hospital November 17, 1939, and March 16, 1940; Hospital Unit No. 82313. Coincident with the development of a pituitary type of obesity the patient began to have petit-mal attacks at the age of 7. One year later grand-mal attacks developed. Two years ago obsessive-compulsive behavior and "temper tantrums" began to appear. The obsessions consist of sporadic, uncontrollable preoccupations with suicide and patricide whenever he becomes morose or irritated at his father and inordinately concerned over the possible death of his mother. As a result of the latter he has developed a peculiar type of compulsion. Whenever he passes his mother at home he has to place his right hand below his left hand on his abdomen and count three steps so as to be sure that he will pass her with his right foot forward. If he should pass a boy who has lost his mother he has to lower his left hand and pass him with his left foot forward. Any deviation from this ritual may bring death to his mother and although he realizes the foolishness of these actions he cannot avoid executing them. Certain numbers bring up obsessive rhymes and thoughts. For example "one" rhymes with "done" and is associated with the thought that his mother is the first to die. The number "eight" rhymes with "gate" and he must say "eight close the gate"

which is associated with the thought that his mother has died and they are going to close the gate in front of the house because she is no longer there. He has to say his prayers three times. The obsessions of suicide or patricide would result in a dramatic plea for poison to kill himself or a gun to shoot his father. His "self-destructive" acts would consist of pounding his head or his abdomen forcibly with his fists. On several occasions the police have been called to "make him behave." He was admitted to the psychopathic division of the Rochester Municipal Hospital November 17, 1939, in a suicidal-patricidal mood.

Family History.—The father is an excitable, domineering person. The mother is a semi-invalid, who is over-solicitous of the patient. An older sister is intelligent and well-adjusted.

Personal History.—Birth was instrumental and early development up to the age of 7 was normal. Study at the Strong Memorial Hospital in 1933 (at the age of 11) revealed an extremely small sella turcica and a feminine type of fat distribution. The diagnosis made at that time was (1) obesity due to pituitary dysfunction, (2) epilepsy. School progress was normal until the age of 12 when he was in the sixth grade. At this time seizures became so frequent that he was removed from school. Since then he has remained at home. Masturbation has been a constant problem since the age of 6.

Personality.—He is an immature youngster who confides to friend or stranger about his epilepsy and masturbatory activity. His companions are children or adults since his contemporaries consider him a "sissy."

Physical Status.—This disclosed obesity located chiefly in the thighs and trunk and a small penis and prostate. The neurologic examination was not remarkable. He is ambidextrous, right-footed and right-eyed.

Psychiatric Status.—His *general behavior* suggested mental retardation; however, he was cooperative, somewhat loquacious and rapport was easily established. Mood was usually one of contentment and cheerfulness but occasionally he would become morose, and threaten suicide. At these times he would unobtrusively go to his room, lie down on the bed and pummel his head and abdomen with his fists. I found him in this act on one occasion and went to his bedside. He stopped pounding himself for a few moments pleading that I stay far enough away because otherwise he might hit me accidentally. On other occasions several attendants were required to restrain him from this masochistic orgy. Visits by his father often resulted in threats of murder and on two occasions the patient assaulted him. *Special preoccupations* have been described in the present illness. He was *oriented* correctly. *Remote* memory was good but *recent memory* and immediate *retention* were slightly impaired. According to the sister he would see a cinema a second time and not appreciate the fact that he had seen it. He was never able to keep scores in two bowling alleys although he had no difficulty with one alley. *Calculation* was well done but *general information* and *judgment* were poor. Psychometric studies revealed a Binet level of 11 years, 2 months.

Laboratory Studies.—Electroencephalograms revealed low amplitude delta waves (2-3 per second) in the frontal areas bilaterally upon hyperventilation.

Course.—Usually he was cooperative and pleasant except for occasional transient spells of moroseness or irritability.

Operation (Abortive).—On January 14, 1940, he was scheduled for a craniotomy and after scalp incisions were made an emergency situation arose which necessitated discontinuance of the operation and accordingly incisions were sutured and patient was returned to the division.

Course.—His behavior was unchanged, he continued talking to visitors and other patients about his masturbation. He made himself very unpopular with the other patients because of "compulsive" masturbation during visiting hours. He was finally discharged home February 2, 1940. Five days later after a severe argument brought on by some trivial affair between the father and patient, the patient was taken to live with relatives on a farm. While there he had no attacks for about two months but shortly after returning home began to express suicidal and patricidal threats. He was readmitted to the psychopathic division March 16, 1940. The findings were essentially the same as upon his previous admission.

Operation.—On March 22, 1940, a *left* frontoparietal craniotomy was performed and the *corpus callosum was sectioned almost completely, only the very tip of the splenium being left uncut.*

Course.—F. convalesced rapidly. The obessions and compulsive acts diminished appreciably. However, he still had to pray three times when asking for a favor, and while kneeling, the right foot had to be over the left foot. Throughout his stay in the hospital no masturbatory episodes nor spells of irritability were observed. On two occasions he commented on some epigastric discomfort which he considered an aura but no convulsions occurred. He was discharged May 2, 1940. The formal psychiatric examination revealed essentially the same findings as before operation. The Binet level was 13 years. This rise post-operatively is probably best explained by the fact that the patient may have been somewhat confused when the preoperative psychometric examination was performed. On November 8, 1940, he was brought to the hospital after a dramatic effort to kill himself with 0.35 gram of phenobarbital. This was precipitated by a quarrel with his father.

Discussion

It is quite obvious from the study of the first two cases that no changes were seen in the behavior of these patients after complete (case 1) or partial (case 2) section of corpus callosum. That is the psychobiologi-

cal characteristics of both patients which were directly related to the seizures such as occurred in the pre- and post-convulsive stages and in the nature of equivalents were unchanged in so far as these studies can reveal. As in the cases of the so-called apparently normal behaving epileptics in which neither quantitative nor qualitative changes were seen (1), no fundamental changes in the personalities of these psychopathic epileptics occurred.

In the psychoneurotic group (cases 3 and 4) the effects of partial sectioning of the corpus callosum varied. Considering the marked degree of suggestibility found in neurotics this variation is not remarkable. In each case control situations fortunately occurred. Case 3 had had a right temporal lobectomy two years before the partial corpus callosum section. Her reaction to the lobectomy was the assumption of a chronic invalid rôle. This invalidism was accentuated after the second operation as might be expected in this type of patient. In general practice many patients addicted to polysurgery are apt to show an exaggeration of their invalid attitude after each operation. The lassitude and difficulty of decision of this patient can hardly be attributed to the sectioning of the corpus callosum primarily but I believe it is more reasonable to consider it as a further manifestation of her invalid reaction which is inherent in her personality. Psychotherapy of a simple type in which persuasion was utilized has helped this patient sufficiently to allow her to work as a social secretary on a part-time basis.

Case 4 is probably the most interesting. The control situation was not as satisfactory as in case 3 for the patient was informed of the cancelled craniotomy shortly after awakening from the anesthetic. His behavior continued the same as before the aborted surgical attempt. Following the sectioning of the corpus callosum the obsessive-compulsive behavior disappeared almost completely and for a time at least his behavior became exemplary. The question naturally arises: Is this improvement the result of the corpus callosum section alone? Four factors must be considered. First, general experience with psychasthenics discloses the sporadic appearance and disappearance of obsessions and compulsions under situations which produce or relieve excessive emotional strains that these patients meet. For six months after operation this patient remained free of grand-mal seizures and his behavior was so much improved that the family and friends became more congenial in their attitude to the patient. Coincidently, the father's domineering attitude diminished as a result of the patient's improvement in behavior and the appreciation of the dramatic side of his operation. Second, the effect of suggestibility must be considered. Patients with obsessive-ruminative tension states are usually refractory to suggestion (Woolley(7)) but mentally dull individuals are apt to be very suggestible. Third, the diminution in frequency of the grand-mal seizures may conceivably have had some ameliorating effects upon the obsessions and compulsions. Fourth, a patient not reported in this series exhibited among other symptoms of a depressive nature, a temporary obsessive-ruminative tension state characterized chiefly by mysophobia following partial sectioning of the corpus callosum. It appears evident, therefore, that the amelioration of the obsessive-compulsive behavior cannot be directly attributed to the corpus callosum section.

Summary and Conclusions

In two epileptics with "psychic equivalents" no change in behavior during the convulsive-free periods or in the equivalent state was observed following partial or complete section of the corpus callosum.

In one epileptic with a chronic invalid reaction no change was observed following partial section of the corpus callosum.

In a fourth mentally retarded epileptic with compulsive-obsessive behavior and suicidal and combative tendencies the improvement which occurred cannot be directly related to the partial sectioning of the corpus callosum.

In conclusion, no obvious change in the various manifestations of personality under the changing conditions found in epilepsy could be discerned following partial or complete section of the corpus callosum.

BIBLIOGRAPHY

1. Akelaitis, A. J. E.: Psychobiological studies following section of the corpus callosum. A preliminary report. Am. J. Psychiat., **97**: 1147, 1941.

2. Moniz, E.: Tentatives operatoires dans le traitement de certaines psychoses. Masson, Paris, 1936.

3(a). Freeman, W., and Watts, J. W.: Prefrontal lobotomy in the treatment of mental disorders. South. Med. J., **30**: 23, 1937.

3(b). Freeman, W., and Watts, J. W.: Some observations on obsessive ruminative tendencies following interruption of the frontal association pathways. Bull. Los Angeles Neur. Soc., **3**: 51, 1938.

4. Lyerly, J. G.: Prefrontal lobotomy in involutional melancholia. J. Florida Med. Assoc., **25**: 225, 1938.

5. Van Wagenen, W. P., and Herren, R. Y.: Surgical division of commissural pathways in the corpus callosum. Relation to spread of an epileptic attack. Arch. Neurol. and Psychiat., **44**: 740, 1940.

6. Parsons, F. H.: Psychological tests of patients one year after section of the corpus callosum. Psychol. Bull., **37**: 498, 1940.

7. Woolley, L. F.: Studies in obsessive ruminative tension states. VI. Treatment. Psychiat. Quart., **12**: 772, 1938.

EXPERIENCES WITH A NEW CRIMINAL CODE IN NEW YORK STATE[1]

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Prior to September 1, 1939, when in the case of defendants indicted on felony charges in New York City and awaiting trial, the question of sanity appeared to be in doubt, the judge of the court of jurisdiction, usually the county courts or in Manhattan the Court of General Sessions, appointed at his discretion a Lunacy Commission which consisted of three members. The New York City criminal courts in determining the question of sanity, heretofore operated under section 658 of the Code of Criminal Procedure of the State of New York (enacted in 1910), as amended. This section was originally derived from chapter 666 of the Laws of 1871. Before 1936, none of the members of the commission which comprised a physician, an attorney and a lay person, usually a business man, legally required any psychiatric knowledge or training. Furthermore, the physician on the commission did not have to be a psychiatrist and generally the physicians who were appointed to the lunacy commissions had no psychiatric qualifications or experience. In 1936, however, the law was amended, requiring that one of the three commission members must be a qualified psychiatrist. Under chapter 459 of the Mental Hygiene Law of the State of New York(1) a board known as the Board of Psychiatric Examiners and consisting of the State Commissioner of Mental Hygiene and the head of the department of psychiatry or of neurology and psychiatry of a medical college in New York State appointed by the State Commissioner of Education, the State Commissioner of Correction and a physician selected by the Council of the Medical Society of the State of New York, has been empowered to certify qualified psychiatrists. Physicians in order to qualify must be licensed to practice medicine in New York State and have had at least five years actual practice which is to include either two years full time practice in the care and treatment of persons suffering from mental diseases or defects in an institution providing for the care of such persons and having accommodations for at least 50 patients, or five years practice wholly or substantially devoted to the care and treatment of persons suffering from nervous and mental diseases or defects, or else three years experience in a clinic approved by the board devoted to the diagnosis and care of mental disorders and whose competency has been certified by two psychiatrists duly qualified by the provisions of this act. The applicant shall fulfill such additional requirements as may be established by the board from time to time. Recently there has been an added requirement that applicants who have had experience in out-patient clinics only, must have had a minimum of 800 hours experience in such clinic.

Previous to 1936, the law did not require any finding as to the sanity of the defendant at the time the crime was committed but an opinion only as to whether the defendant was in suitable mental condition to stand trial. In addition to the amendment in 1936, requiring that one of the members of the lunacy commission should be a qualified psychiatrist, it was stipulated that a report was to be made as to the mental state of the defendant at the time of the commission of the crime.

It is interesting to note that the law did not make the appointment of lunacy commissions mandatory, but that the use of such commissions was optional with the court. Furthermore the court could accept the findings of the lunacy commission as entirely advisory, and could if it deemed it preferable, select the findings of the psychiatric reports furnished by Bellevue Hospital or Kings County Hospital. The Borough of Queens, one of the five counties in New York City, has never employed lunacy commissions but has always depended on the psychiatric reports rendered by the psychi-

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Va., May 5-9, 1941.

From the psychiatric division, Bellevue Hospital, New York City and the department of psychiatry, New York University.

atric division of Bellevue Hospital in Manhattan and Kings County Hospital in Brooklyn. For many years this procedure in Queens County has worked satisfactorily with no additional cost to the city as the facilities of both these divisions were available to the court. In many instances, defendants had been under observation and examination either in Bellevue or at Kings County Hospital. After a report of the findings was made to the court, lunacy commissions were appointed, usually if the report had stated that a psychosis was present. Often the psychiatrists who had rendered the report were subpœnaed by the commissions to testify as to their observations, findings, diagnosis and recommendations. Experienced psychiatrists were cross examined by the attorney and the lay member of the commission and legalistic matters comprised a portion of the interrogation at such hearings. This method meant duplication of work, valuable loss of time while the commission was supplied with essential psychiatric findings, some of which the lunacy commission could not have obtained without the observations and examinations possible only in a well-organized psychiatric hospital, and including laboratory findings, x-ray reports, physical examinations by the internists and in special departments of the general hospital, twenty-four hour observations by psychiatric nurses, the daily observations of the psychiatrists and often the opinions given in staff conferences.

The lunacy commission system and its practical operation created a great deal of public criticism and complaints so that finally the Office of the Commissioner of Accounts (2) in New York City was delegated to make a survey and report of the situation. Paul Blanshard, commissioner of this investigating body and Irving Ben Cooper, special counsel, on December 14, 1937 submitted to Mayor F. H. La Guardia, a summary of their findings and recommendations concerning lunacy commissions. The investigators reported that in the seven year period from January 1930 to December 1936, "Lunacy Commissions have cost the City of New York $1,359,949 and that one million dollars of this amount has been sheer waste, since the service performed by lunacy commissions could readily be performed by the psychiatric divisions of the city hospitals with a small additional force." The average cost per case was about $850, each member of the lunacy commission receiving about $250. The report further stated that "the work of lunacy commissions has not been competently done and that specialists in this field consider the findings almost valueless. The reports of 85 lunacy commissions in Kings County alone in the last five years (*i.e.*, 1931-1936) have been rejected by the court as not reliable. In each case, the judges turned for guidance to the opinions of two doctors appointed pursuant to the provisions of the Mental Hygiene Law or to the trained psychiatrists of Kings County Hospital. The cost to the city of these rejected reports was approximately $75,000. The appointment of lunacy commissions is often characterized by personal or political favoritism, particularly in Kings County. The 1936 amendment that a qualified psychiatrist should be added to the lunacy commission was a step in the right direction but it improved the situation only slightly and did not eliminate the defects and abuses of this system."

During the inquiry made by the Blanshard committee, many lay members of the lunacy commission were examined in order to determine what standards have been employed by them in determining sanity. The investigators concluded that "the answers and explanations have varied to such an extent that the conclusion is clear that laymen on lunacy commissions do not have definite standards. They attempt to determine insanity on a hit or miss basis. The testimony of various lunacy commissioners who have been examined in the inquiry indicates why the conclusions of the lunacy commissioners have so often been rejected as valueless. Our witnesses have been almost unanimous in the opinion that the average layman, without some experience in lunacy matters, is of no value as a commissioner. The lawyer commissioners who have testified in the inquiry have all readily admitted that they never explained the law to their fellow commissioners. The doctors have been unquestionably the most valuable members of the various lunacy commissions, so valuable in fact that there appears to be no good reason why the whole question of determining insanity should not be referred to doctors alone."

The Blanshard committee report concluded

that "the obvious waste of money was due to politics and that the lunacy commissions provide 'gravy' for certain political leaders and their friends. Occasionally direct family favoritism is responsible for selection of members of lunacy commissions." One commissioner, a physician received $46,700 in fees during the seven-year period through appointments to 197 commissions. One commissioner neither a doctor nor a lawyer received $27,800. In their recommendations, the Blanshard committee proposed that the remedy was a revision of sections 658 and 870 of the Code of Criminal Procedure whereby Judges of General Sessions and all the county courts in New York City would refer all cases for psychiatric examination to the psychiatric divisions of city hospitals.

In a communication to the Editor of the AMERICAN JOURNAL OF PSYCHIATRY published in November 1938, Dr. Winfred Overholser(3), Chairman of the Committee on Legal Aspects of Psychiatry, citing the Robert Irwin case as an example in his comments upon the operation of the lunacy commission system and the opinions of the psychiatrists in the Irwin matter, stated as follows. "Although the law permits in its discretion to commit the defendant to a mental hospital for observation and although this procedure was urged upon the court by the defense counsel, the provision was not utilized. The document was penned by a lawyer since it is couched almost entirely in legal terminology. The attitude expressed is that of an inquisition. The atmosphere permeating the entire proceeding was from the description given about as far removed from that of a consultation or psychiatric examination as could well be imagined. The abolition of such lunacy commissions as the one responsible for the report here discussed would be highly desirable."

In 1938, a bill abolishing the lunacy commissions passed both houses of the New York State Legislature but on account of certain technicalities, was vetoed by the Governor. In 1939, however, a bill introduced by State Senator Thomas C. Desmond, was passed and signed by Governor Lehman on June 16, 1939, to become effective September 1, 1939. In an article entitled "New York Wipes out Lunacy Commissions" in the July 1939 issue of the AMERICAN JOURNAL OF PSYCHIATRY and also in an article published in the Journal of Criminal Law and Criminology in January 1940, Senator Desmond(4), (5) reviews the important points and significance of the new law which replaced the lunacy commission method. Senator Desmond explains that to the accused, the new law assures a scientific procedure for it turns over to psychiatrists the medical problem of determining sanity at the time of trial and that to the psychiatrist it means an opportunity to determine the sanity of the defendant unhampered by political appointees, lawyers and laymen.

The new law is known as "The Amended Code of Criminal Procedure of 1939, Paragraph 870, 658-662a-d and the phraseology of this law can be consulted in the State of New York Handbook of the Department of Mental Hygiene for 1939 or 1940(6). This new legal procedure requires that psychiatric examinations of those charged with criminal offenses be made exclusively by qualified psychiatrists employed in public hospitals and that the psychiatrists are only to render a report of the defendant's sanity as to whether he is capable of standing trial. No report is required as to the defendant's sanity at the time of the commission of the crime. The provisions and requirements for psychiatric examinations of defendants charged with crimes in the minor criminal courts have been included in this amended code of criminal procedure.

Amended section 870 of the new law provides that when the court recognizes that there is reasonable ground for believing a person indicted for felony or charged with a misdemeanor is in such a state of idiocy, imbecility or insanity that he is incapable of understanding the proceedings or of making his defense or if the defendant pleads insanity, the court may order the defendant to be examined to determine his sanity. If the defendant is charged with an offense which is not a crime and if the qualified psychiatrists who have examined him report that though he is incapable of understanding the charge against him or making his defense but deem the defendant's discharge not dangerous to the public peace and safety, the court may suspend the proceedings and re-

lease the defendant either on bail or probation. When he is no longer in such a state of insanity as to be incapable of understanding the charge, the court shall require that he be brought again into custody and the proceedings against him resumed. On the other hand in cases where the offense is not a crime, the court instead of committing him to a state hospital, may direct that the defendant be committed to a state hospital as provided by the Mental Hygiene Law in which an application for commitment is made before a Supreme Court Justice.

Under section 659, the court requests that the director of psychiatry of the Department of Hospitals in the City of New York, designate two qualified psychiatrists selected from his psychiatric staff to conduct the psychiatric examination of the defendant. Outside of New York City, a superintendent in charge of a state hospital is ordered to designate two qualified psychiatrists from his hospital staff to conduct the examination. Under section 661, each psychiatrist so designated takes the oath prescribed by the civil practice act to be taken by referees. This oath taken before the commencement of the examination is attached to and made part of the report to the court. The psychiatrists may compel the attendance of witnesses, the production of books and records and may administer oaths. Upon the request of the psychiatrists, subpœnas shall be issued and served by the clerk of the court. Under section 662, a full and detailed report is made to the court in duplicate, signed by the two qualified psychiatrists who have been designated by the director of psychiatry and in which it is to be stated whether the defendant is or is not in such a state of idiocy, imbecility or insanity as to be incapable of understanding the charge against him or the proceedings or of making his defense. The report is to include a recommendation as to the appropriate institution to which the defendant should be committed. If the court does not concur with the findings of the psychiatrists or if the two psychiatrists do not agree in their findings, the proceedings against the defendant may be resumed or the court may request the director of psychiatry to appoint a third psychiatrist and submit a report to the court. The report of the psychiatrists shall not be received in evidence upon the trial of the defendant. The report is filed in the office of the clerk of the court and is subject to inspection only on an order of the court. The duplicate copy of the report is transmitted by the clerk of the court to the superintendent of the institution to which the defendant is committed. The court may commit a defendant to a hospital under the control of the department of mental hygiene, that is a civil state hospital; or a hospital under the control of the department of correction, that is a state hospital for the criminal insane. When a defendant charged with a crime has recovered to the extent that he can understand the nature of the charge and aid counsel in his defense, the superintendent of the hospital where the defendant is confined shall inform the court so that the defendant may be returned to the court and the proceedings against the defendant resumed, and he shall be brought to trial or legally discharged.

In order to provide for an increase in the number of admissions and for the greater requirements and duties anticipated under the new law, the City of New York furnished the sum of $37,280 yearly. With this addition to the budget of the psychiatric division of Bellevue Hospital and Kings County Hospital there have been appointed four full time qualified psychiatrists, two psychologists, two psychiatric social workers and other necessary personnel such as stenographers and clerks. An additional psychiatric social worker will probably be appointed in the near future. The Blanshard committee investigating lunacy commissions expressed the opinion that under a scientific procedure abolishing lunacy commissions, the number of requests for psychiatric examinations would diminish. They based this opinion on the presumption that lawyers often requested lunacy commission examinations when their claims were without foundation on the chance that they could persuade a layman's commission to find insanity in a defendant who is not actually insane. Between 1930-1936, the number of lunacy commissions averaged 249 per year and on the basis of the appropriations made in 1936, there were 205 lunacy commissions in that year. In 1937 and 1938 with appropriations of $374,950, the

lunacy commissions averaged 220 per year. The lunacy commission appointments were made exclusively by the county courts such as Kings County Court in Brooklyn, General Sessions in Manhattan, Bronx County Court in the Bronx and Richmond County Court on Staten Island. As stated previously the Borough of Queens has never appointed lunacy commissions but has referred all requests for psychiatric examinations to the psychiatric divisions of Bellevue and Kings County Hospital. In Kings County the average yearly appointments of lunacy commissions amounted to 144 or 57 per cent of the total in the entire city between the years 1930-1936. In 1937 and 1938 at a cost of $234,350 Kings County averaged 137 lunacy commissions per year. In the years 1930-1938 the total cost in Kings County for lunacy commissions was $1,093,900. In 1938, the last year when lunacy commissions were functioning throughout the entire year, 56 defendants were admitted to the psychiatric division of Kings County for mental observation at the request of the Kings County Court. In 1939 when the lunacy commissions functioned until September 1st, there were 97 admissions to Kings County Hospital and in 1940 110 admissions on commitments from Kings County Court. In addition Kings County Court sent 7 defendants to Bellevue in 1940. The Court of General Sessions average 76 lunacy commissions yearly appointments and spent $365,489 in this seven year period. In 1938, 53 were admitted to Bellevue at the request of the Court of General Sessions and 7 from Felony Court. In 1939 there were 73 admissions from General Sessions and 39 from Felony Court, while in 1940, there were 61 admissions from General Sessions and 75 from Felony Court. In 1938 there were committed 112 felony cases to Bellevue from the county and felony courts. In 1939, there were 229 such commitments, an increase of over 100 per cent, while in 1940 there were 213 admissions from the various county felony courts. Bronx County Court which averaged 29 lunacy commissions per year, committed 37 defendants to Bellevue in 1938, 32 in 1939 and 58 in 1940. In the two psychiatric divisions there were examined in 1940 a total of 401 defendants charged with felonies. In addition there were 544 defendants committed to the two psychiatric divisions from the minor courts such as Special Sessions and the magistrates' courts for examination under Section 870 and 658 of the new law.

Prior to the actual operation of this new criminal code, a conference was held at Bellevue Hospital in which there participated representatives from the various criminal courts, the district attorney's office, the state hospitals, the corporation counsel's office and the director of psychiatry of the Department of Hospitals. The Court of General Sessions arranged the following plan for all defendants committed by that court for psychiatric observation and examination. The hospital was to furnish the court the usual report customary prior to the new law and in the event that the defendant was found psychotic, the court would thereupon request what it termed a formal hearing. This formal hearing functioned in its technical details in a way similar to the lunacy commission form of examination although the hearing could be held at Bellevue Hospital whereas the lunacy commission held its hearings in the City Prison. Minutes of the entire proceedings containing all testimony, cross examinations and the psychiatric examination of the defendant were made part of the record furnished the court. At this hearing, the defendants counsel, a representative from the district attorney's office and the corporation counsel's office, for the purpose of aiding the psychiatrists from a legal standpoint, have been present. Witnesses at the hearing were called under subpœna issued by the clerk of the court, the defendant's counsel as well as the psychiatrists submitting the names of witnesses whose presence they deemed necessary at the hearings. Twenty-three such formal hearings have been held in 1940, a small number of these including defendants outside the borough of Manhattan. Experience indicates that the employment of such formal hearings routinely is not desirable because much time has been wasted by the various legal representatives in legalistic arguments which had no relationship to the conduct of the examination by the qualified psychiatrists. The new law turns over to the qualified psychi-

atrists exclusively the examination of the defendant so that they can make their examinations in accordance with scientific methods, entirely unhampered by legalistic procedures which in the past also involved the participation of individuals neither psychiatrists nor attorneys. On the other hand, in special circumstances where an opinion is difficult to make and where information from outside sources appears to have been withheld, especially where contradictory or confusing data have been received, it is felt that a formal hearing at which witnesses can be interrogated under oath, may be absolutely essential. It is felt, however, that requests for such formal hearings should be made on the advice and suggestion of the qualified psychiatrists conducting the examination rather than employing this method of examination routinely.

In the Court of Special Sessions handling misdemeanors classified as crimes, following a report by the qualified psychiatrists rendering an opinion that the defendant was found psychotic, it has been often necessary for the psychiatrists to appear in court for cross examination at the request of the district attorney, when either defendant or his attorney has objected to the psychiatrists' opinion and possible commitment to a mental hospital. The object of such hearings in open court is to preserve the defendant's constitutional rights and to give him an opportunity to have a full hearing in relation to his objections against possible commitment to a mental hospital. This hearing in some ways is similar to the right that any patient, not facing a criminal charge, would have in Bellevue Hospital for a hearing before a Supreme Court Justice when an application has been made for the patient's commitment to a mental hospital. It is felt that such hearings in open court are not desirable and that the defendant would be spared the objections of a hearing in open court if he were heard in the judge's chambers. This would be similar to the manner in which hearings are conducted by Supreme Court Justices in proceedings pertaining to state hospital commitments. In a few instances, the qualified psychiatrists have also been required to testify in some of the county courts under similar or other circumstances, either at the request of the defendant's counsel or the district attorney. In one case where a defendant being tried on a murder charge was reported sane, his counsel had put in a plea of insanity and had brought in other psychiatrists to testify to the insanity of the defendant. This case indicates that the new law will not eliminate the so-called "battles of the experts."

In only three cases, one of them a felony, have there been requests by the court for the appointment of other psychiatrists and a reexamination. In the felony case, the defendant's counsel objected to the findings which stated that the patient was not psychotic and requested another examination. In one misdemeanor case in which a magistrate was not satisfied with the psychiatric findings which reported the defendant psychotic, another judge on the basis of findings by other qualified psychiatrists, finally committed the patient to a state hospital.

From the writer's experience with this new criminal code, the conclusion can be made that this legislation generally has been a marked improvement over the lunacy commission method in that the defendant can obtain a far more reliable and scientific method of examination. Furthermore, the defendant's constitutional rights are not jeopardized and the traditional jurisdiction powers and discretion of the court are not modified by the new law. A trained psychiatric social worker with experience in penal institutions, after consultation with the qualified psychiatrists conducting the examination, makes field investigations and obtains histories from all necessary sources concerning the defendants family history, background, personality, behavior and social adjustments in addition to the interviews the psychiatrists have had at the hospital with relatives or friends. In addition, social service exchange reports, material from other institutions and hospitals, probation bureaus and parole commissions are obtained by the social service worker who frequently searches through original files for pertinent and relevant data which may be of psychiatric value. Very little difficulty is experienced in securing information from any source found necessary in the compilation of data useful for consultation before reaching

a final opinion. Witnesses have not been subpœnaed except in the instances where formal hearings have been held. Through the methods and practice of the psychiatric hospital, as a rule, a minimum degree of difficulty is experienced in obtaining personal contact with informants or in securing material from various available sources. Furthermore the 24 hour supervision and observation under trained psychiatric nurses and the daily contacts with psychiatrists over a period of weeks and even months when necessary, certainly allows for a more reliable and accurate opinion of a defendant's mental condition. In the lunacy commission method, a formalistic and legalistic procedure with the defendant present when witnesses gave testimony, had various and obvious disadvantages. An hour or two contact with the defendant and then perhaps a series of additional contacts from time to time certainly did not provide sufficient means for adequate and reliable study in all cases. In one case committed to Bellevue where a defendant charged with arson had been examined several years previously by a lunacy commission which had declared him insane, the minutes of the commission report showed that the defendant had claimed amnesia for the fire setting. The commission had failed to secure data from the Fire Marshal's office which immediately after the fire had obtained a detailed and very important confession from the defendant. This confession threw a great deal of light on the defendant's mental condition and clearly indicated that amnesia did not exist.

A few amendments to the existing law are proposed. While the magistrates' courts now have the power to commit to state hospitals either under the supervision of the Department of Mental Hygiene or the Department of Correction, no provision has been made concerning state schools for mental defectives. A criminal court judge even in misdemeanor cases cannot commit a defendant to a civil state school and such commitments can be made only by a Supreme Court Justice in cases where criminal charges are not pending. It is suggested that there be made an amendment which would give judges in all criminal courts the power of commitment either to a state school under the Department of Mental Hygiene or to an institution for defective delinquents under the Department of Correction, provided that such defendants have been convicted of a criminal offense.

Another suggested amendment would empower judges of the magistrates' courts and Special Sessions in their discretion in certain cases where misdemeanors which are criminal charges are pending, to declare on their commitment orders that if the qualified psychiatrists find the defendant psychotic and are of the opinion that he is in need of care and treatment in a mental hospital, the psychiatrists may proceed under the Mental Hygiene Law in securing a commitment order to a mental hospital from a Supreme Court Justice. Upon commitment to a state hospital, the court is then informed regarding such commitment and the state hospital will subsequently notify the court whenever the defendant has recovered sufficiently to stand trial.

In conclusion, experience indicates that the new law is a distinct improvement in the very difficult field of determining the question of the sanity of defendants held on criminal charges. A definite advance has been made both from the legal and psychiatric standpoint. While there have been some objection and dissatisfaction from a few sources with this new code and while some defects may exist, it is believed that indicated amendments will serve in the further improvement of the Desmond Law which so far has provided a more scientific and reliable procedure than has been the case in the past.

BIBLIOGRAPHY

1. Certification of qualified psychiatrists. Handbook of the Department of Mental Hygiene. State of New York, Albany, N. Y., Par. 27, 123-124, 1939.

2. Report to the mayor on lunacy commissions. Office of Commissioner of Accounts, Paul Blanshard, Commissioner. MR 8995; 1-19.

3. Overholser, Winfred: Commissions in lunacy. Am. J. Psychiat., **95**: 733-736, November, 1938.

4. Desmond, Thomas C.: New York wipes out lunacy commissions. Am. J. Psychiat., **96**: 205-211, July, 1939.

5. Desmond, Thomas: New York state smashes the lunacy commissions. J. Crim. Law and Criminol., **30**: 653-661, January-February, 1940.

6. Extracts from code of criminal procedure. Handbook of the Department of Mental Hygiene. State of New York, Albany, N. Y., 269-274, 1939.

PARALLEL PSYCHOLOGICAL, PSYCHIATRIC AND PHYSIOLOGICAL FINDINGS IN SCHIZOPHRENIC PATIENTS UNDER INSULIN SHOCK TREATMENT[1]

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The present preliminary report is a record of certain psychological, psychiatric and physiological findings in schizophrenic patients before, during and following shock therapy. It is an attempt to give a graphic psychobiological picture of some of the changes occurring in patients under such treatment. To the best of our knowledge, this is the first time graphic correlations have been presented of the type of psychic and physiological functions investigated in this paper.

METHODS

The patients investigated were first conferenced by a group of psychiatrists who, after consideration of their complete histories, agreed in placing them in the schizophrenic category. They then were transferred to the research unit in the Toronto Psychiatric Hospital and investigations were carried on for a period averaging one month before insulin shock treatment was commenced. During this month it was possible to select the patients who were coöperative enough to give consistent determinations on the various investigations, and at the same time to acquire a group of patients which did not create too difficult a ward nursing problem.

Psychological.—Each patient under investigation was examined, coöperation permitting, by a comprehensive battery of tests before and after treatment, and by a smaller battery of tests at regular intervals during treatment. The tests were selected to measure a variety of aspects of the individual's efficiency, especially those indicated in the literature and commonly understood to be affected by schizophrenia; and at the same time it was hoped that one of the by-products of such tests, along with the investigations in the other fields, would be a clarification of the central concept of schizophrenia. These tests were administered by an experienced psychologist in the standard way and scored in the standard manner, except where additional scoring was devised to measure impairment peculiar to schizophrenia. The test scores obtained were converted into decile scores based on all available test records for schizophrenics of all types and degrees of illness from severe to remission. Thus a decile score of *one* indicates that the performance of the patient falls within the range of the first, or poorest, decile rate. The various decile scores obtained for a patient in an examination were then averaged and graphed.

Battery of Tests.—Given before and after treatment.

Revised Stanford-Binet scale—Form L.
Revised Stanford-Binet scale—Form M.
Test for perseveration.
Test for orientation—memory.[2]
Progressive matrices.
Logical thinking.[2]
Vigotsky test.[3]
Rorschach.[3]
Healy perception test.
Kent-Rosanoff word association test.
Optimism-pessimism scale.

Periodical Battery.—Given regularly during treatment.

Healy perception test.
Kent-Rosanoff word association test.
Optimism-pessimism scale.
Progressive matrices.

[1] From the departments of psychiatry and medical research, University of Toronto.

This work was made possible by a grant from the Rockefeller Foundation and has been directed by the late Sir Frederick G. Banting and Prof. Clarence B. Farrar.

[2] Specially devised.

[3] Not included for charting.

Psychiatric.—The psychiatric measurements, presented as a psychiatric score, were arrived at by consideration of a patient's clinical picture throughout an entire week, and this consideration included the nurses' records, the occupational therapist's records and the daily observations of the physicians in contact with these patients, as well as one or more interviews by the scorer. These measurements were evaluated under fifty-four headings, with a five point variation in degree for each heading. Any score under 10 was regarded as normal. It is realized that in the clinical observation and scoring it is much more difficult to hold at a minimum the personal equation of the investigator than is the case in the physiological and psychometric determinations. With this in mind the utmost effort was made, in setting up these fifty-four headings, to select terms representing objective manifestations of the patient's mental state—his spontaneous self-expression in behavior and his voluntary reporting of his psychic content. The goal of complete objectivity is of course unattainable. No one can read or feel into the consciousness of another. On the part of the patient there is the difficulty of reporting; on the part of the observer, that of interpreting the report or of judging from behavior the mental state. Independent evaluations were made by two members of the staff during each week, and it was found the average variation between the two independent scores was five points. It is by no means assumed that the score is an absolute measurement of the degree of psychosis, but we believe that it does make possible a comparative clinical measurement to indicate the trend of the psychosis.

Since this work was started in the latter part of 1939, there have been many changes in the headings as difficulties in evaluation became evident and as other terms suggested themselves as representing more accurately the clinical data. The psychiatric score must still be regarded as in process of development, but it is hoped that in the near future it will be in form satisfactory for use by various clinicians in independent clinics with a view to comparable results. We shall not therefore present this score in this preliminary report.

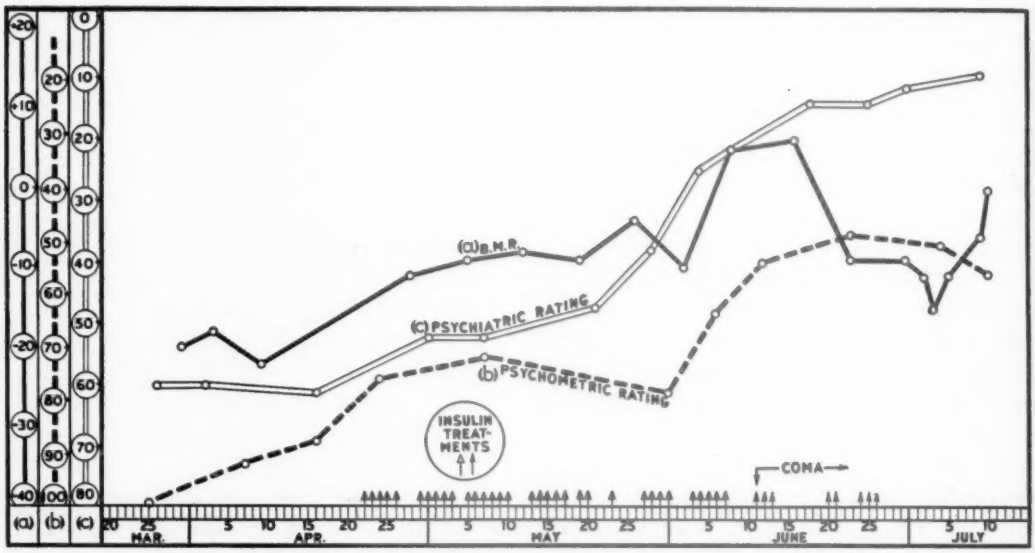
Physiological.—The physiological ratings used were the basal oxygen consumption rates measured by the Benedict-metabolimeter using the Boothby-Sandiford modification of the Du Bois standards. Only quiet, coöperative patients were observed. The reason for selecting the basal oxygen consumption rate for a measurement was the fact that various workers(1) have reported a significant lowering in the schizophrenic types as a group. In addition we assume the basal oxygen consumption rate is a measure of general metabolic activity and is therefore an index of physiological function.

An electroencephalogram was taken routinely on all patients, coöperation permitting. In some cases it was possible to obtain these observations during and following the shock therapy. These recordings were evaluated by the Davis technique(2).

The psychological, psychiatric and physiological observations were made independently by separate members of the staff who were specially trained for the investigations conducted in each department.

Discussion

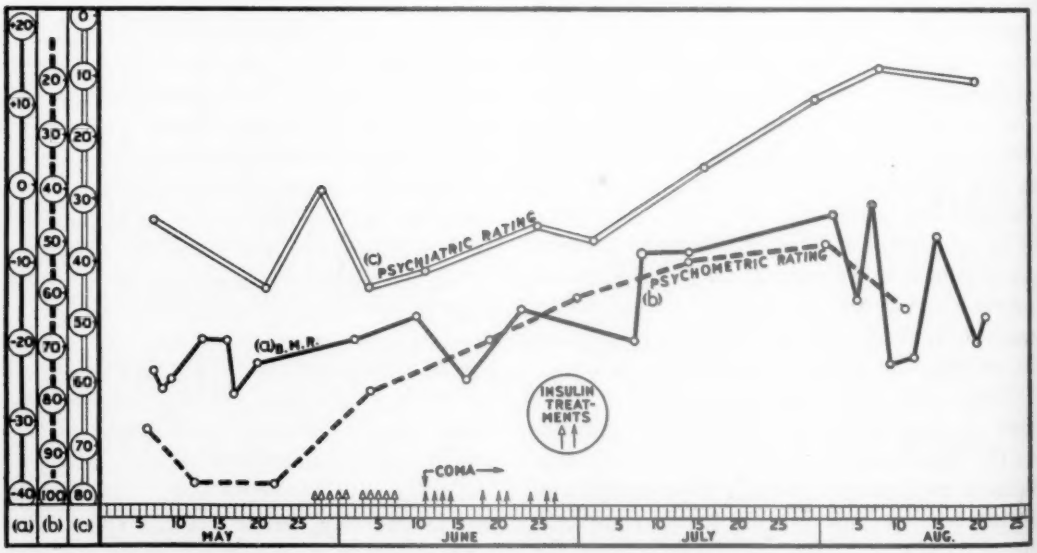
Eight cases have been chosen from the thirty-three investigated to demonstrate the graphic picture in two groups of patients. Graphs 1 to 4 are typical of patients who have recovered clinically and have been discharged; Graphs 5 to 8 are typical of the patients who have shown no significant clinical improvement and are still in hospital. From the eight charts presented, it appears that if the patient's psychiatric rating approaches the normal, so does the psychometric rating as well as the basal metabolic rate. The four cases showing this improvement have all received insulin shock therapy, and in one case thyroid medication was given following insulin treatment. The psychometric and psychiatric ratings show better correlation than the basal metabolic rate, probably because both depend on similar processes and are both a measure of psychic functions. In the case of the basal metabolic rate, we must appreciate that here we are measuring a physiological function primarily, and although there is a psychic factor in this determination, there may be many other



GRAPH 1.—G., G. G. Male, aged 26. Admitted December 18, 1940. Before treatment was bewildered, indecisive, resistive and apprehensive with complete lack of insight. He alternated between restless apprehensive periods and semi-catatonic postures.

Following his 35th treatment his inability to concentrate, his catatonic postures, his mute periods completely disappeared. He wished to leave hospital, showed energy and drive in occupational workshop. He had some plans for his future and was pleasant and sociable.

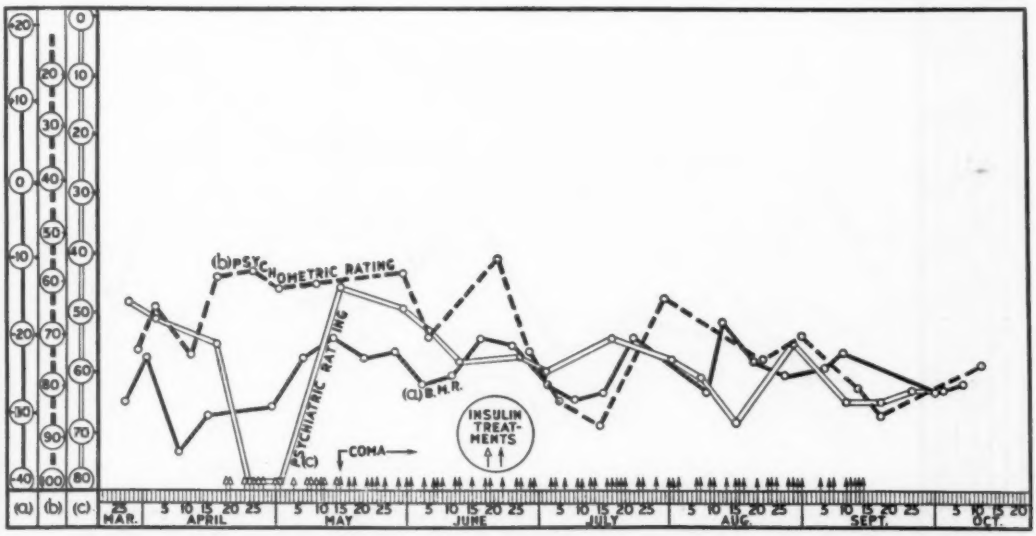
Results of treatment: Full remission.
Diagnosis: Schizophrenia, catatonic type.
Disposal: Discharged July 12, 1941.



GRAPH 2.—S., Y. Female, aged 17. Admitted January 10, 1941. Before treatment showed marked motor and psychic inertia. She was markedly preoccupied and offered no voluntary conversation. Hallucinations were vivid and frequent. Delusions of persecution were present. She was indecisive, had to be spoon fed and was incontinent occasionally.

Following treatment patient was pleasant, coöperative, O. T. work was very good and she entered into ward activities. Her insight was excellent considering her previous intelligence rating and her plans for the future showed fair judgment. She gained 12 lbs. in weight.

Results of treatment: Full remission.
Diagnosis: Schizophrenia, catatonic type.
Disposal: Discharged August 21, 1941.



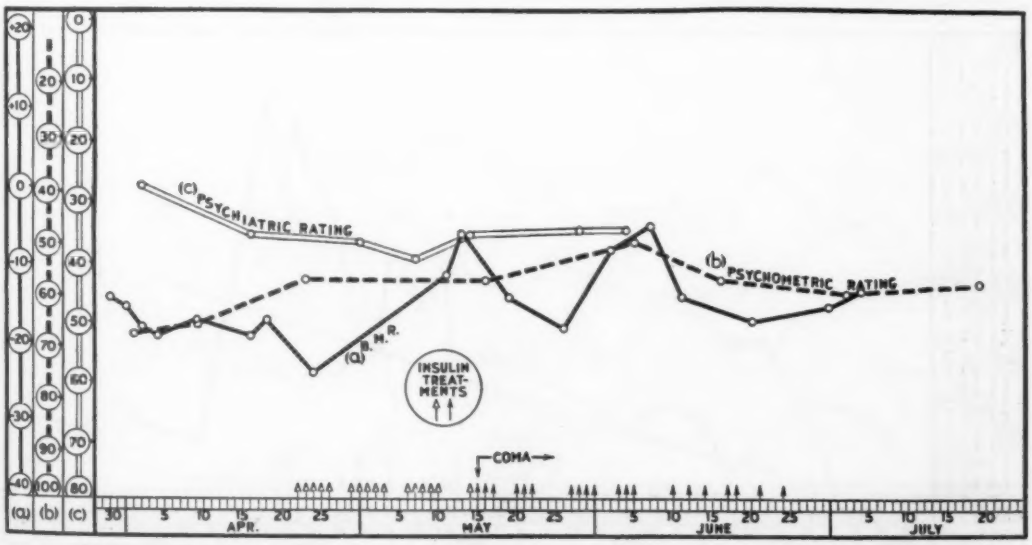
GRAPH 5.—K., G. Female, aged 13. Admitted January 13, 1940. Before treatment was extremely apathetic, constantly preoccupied and seclusive. When addressed, a silly expression appeared on her face and she answered in monosyllables. She maintained a much exaggerated interest in her appearance and showed frequent mannerisms. She had many delusions, extremely bizarre in type, and responded to hallucinations.

Following treatment her mental status was essentially unchanged. She gained 22 lbs. during treatment.

Results of treatment: Negative.

Diagnosis: Schizophrenia, hebephrenic type.

Disposal: Transferred to an Ontario Hospital, October 31, 1940.



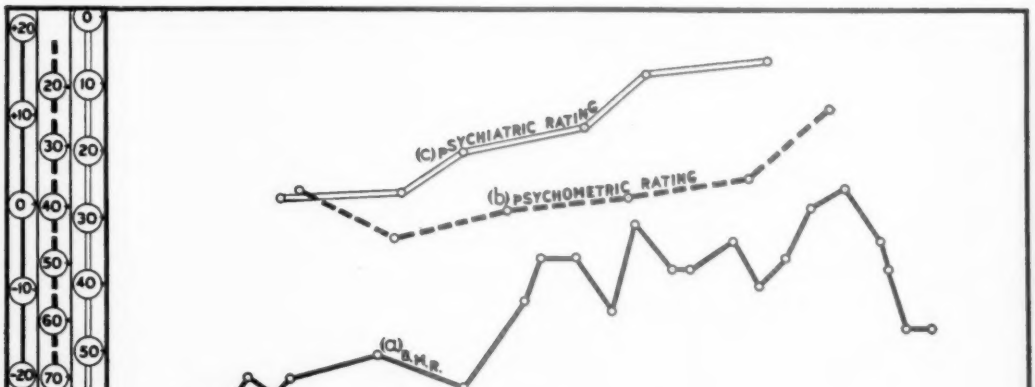
GRAPH 6.—W., P. Male, aged 25. Admitted January 19, 1941. Before treatment showed seclusiveness, and somatic delusions regarding his left eye. He was lethargic, apathetic and his only emotion appeared when he expressed anxiety concerning his eye. Just previous to treatment he showed paranoid ideas and in addition his delusional system increased so that he believed people could read his thoughts.

Following treatment he showed little or no improvement and began having violent episodes making it impossible to care for him on the research unit. He gained 20 lbs. during treatment.

Results of treatment: Negative.

Diagnosis: Schizophrenia, catatonic type with paranoid coloring.

Disposal: Transferred to an Ontario Hospital, July 23, 1941.

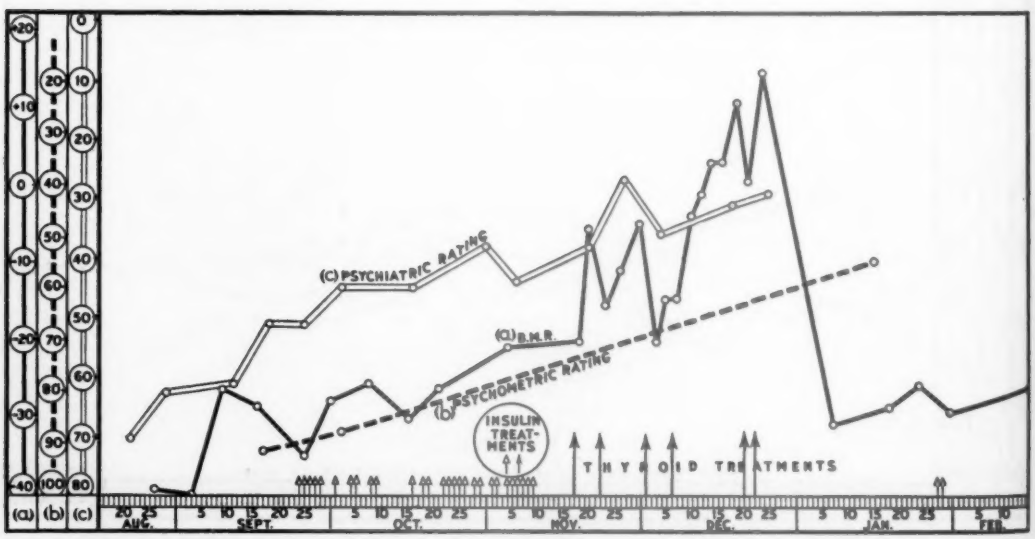


GRAPH 3.—W., M. Female, aged 25. Admitted April 14, 1941. Was suspicious, confused, impulsive, and entertained delusions of reference and persecution. She was sullen and insolent, indecisive and anxious. Her insight was lacking, although an improvement was noted in her mental status before treatment.

Because of the improvement in her condition and the untoward cardiac embarrassment experienced during her first coma, treatment was not carried further. Following treatment she had good insight into the causes of her illness and was planning to obtain a position after a short rest. She gained 4 lbs. in weight.

Results of treatment: Social remission.

Diagnosis: Schizoid episode.



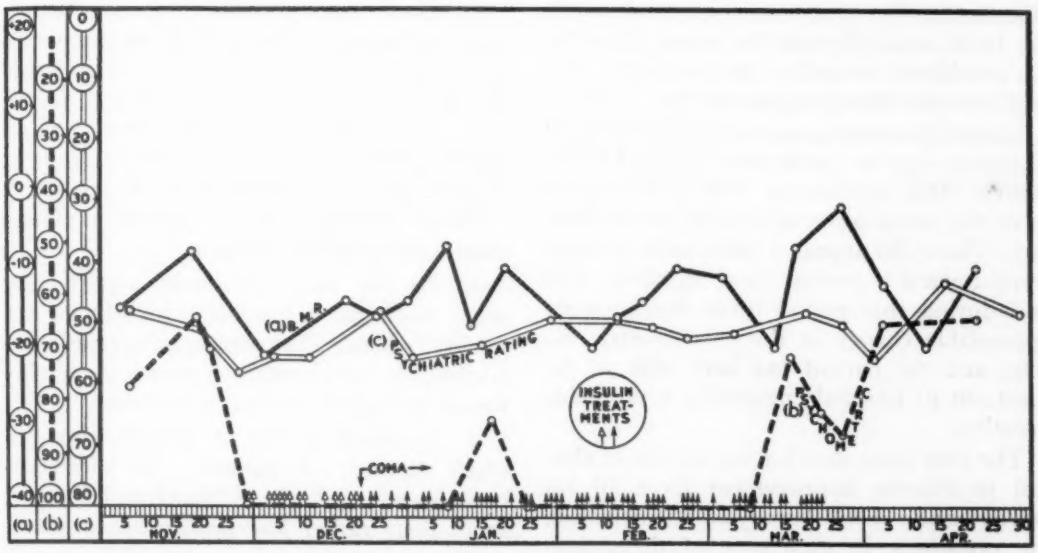
GRAPH 4.—H., R. Male, 24 years. Admitted May 11, 1940. Previous to treatment was mute the greater part of the time, showed extreme psychomotor inertia, and was apathetic. It was necessary to supervise completely his activities and often spoon feeding was met with mild resistance.

Patient gained 12 lbs. during course of treatment.

Following treatment patient showed consistent increase in his interest in occupational therapy work, began to talk in a spontaneous fashion and finally was able to think without difficulty. He was pleasant, friendly and spontaneous in his humor when discharged from hospital on February 1, 1941, and since then has been employed.

Results of treatment: Full remission.

Diagnosis: Schizophrenia, catatonic type.



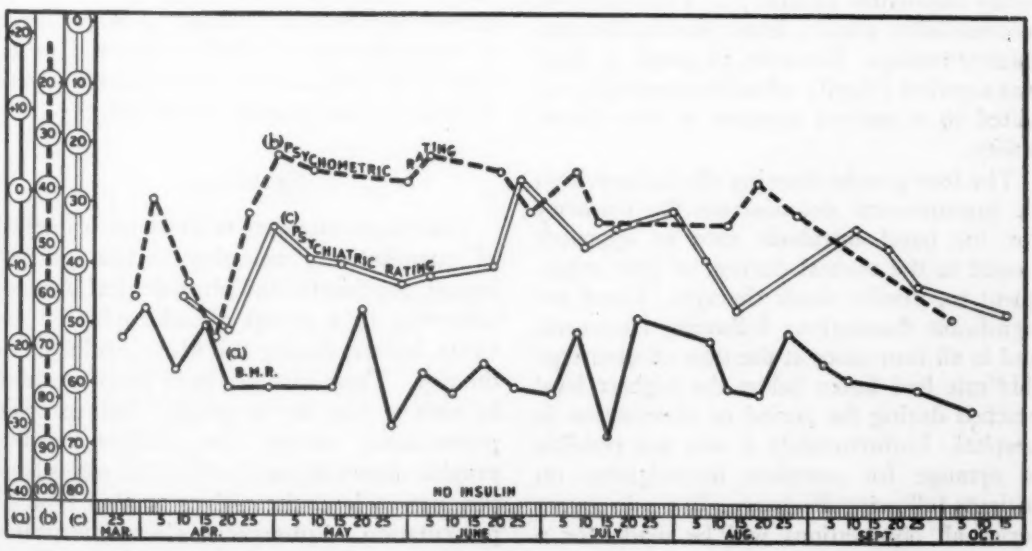
GRAPH 7.—H., A. G. Male, aged 22. Admitted June 21, 1940. Before treatment was very seclusive, required supervision in all except toilet habits. He alternated between marked psychomotor inertia and extreme agitation during which he was talkative and euphoric. He was hallucinated and his delusional system was copious and bizarre. He was disoriented as to time, place and person.

Following insulin and electroshock there was little improvement. His mood swings were less frequent and he was more coöperative. He continued to be seclusive, preoccupied, hallucinated and his delusional system was unchanged. He gained 20 lbs. in weight during treatment with insulin.

Results of treatment: Negative. Very slight improvement.

Diagnosis: Essential schizophrenia.

Disposal: Transferred to Ontario Hospital, August 28, 1941.



GRAPH 8.—B., M. Female, aged 16. Admitted November 22, 1939. Was extremely seclusive, sullen and at times very uncoöperative with frequent outbursts of temper. She had no insight into her seclusiveness and showed obvious apathy.

Following insulin, thyroid and electroshock treatments, this patient was, if anything, more psychotic than before treatment, showing occasional hallucinatory episodes and an increase in the duration and frequency of her irritable and seclusive periods. She gained 4 lbs. during treatment with insulin.

Results of treatment: Negative.

Diagnosis: Essential schizophrenia.

Disposal: Transferred to an Ontario Hospital, August 21, 1941.

factors playing a part, so that a variety of results are possible without altering the psychic factor. There is, however, a tendency in the basal metabolic rate to return closer to the considered normal as the psychiatric and psychometric ratings approach this point.

Graph 4 presents a marked fall in the basal metabolic rate on cessation of thyroid medication. This medication had been started after the termination of insulin shock therapy. There did appear a subsequent gradual trend toward a normal basal metabolic rate and during this period there has been no appreciable change in the psychometric rating, and the patient has been able to remain out of hospital engaged in a profitable vocation.

The four cases showing no significant clinical psychiatric improvement have all received insulin shock therapy and demonstrate the variations, in each type of determinations, which are apparently possible without any significant maintained change appearing in the patient's mental status. The psychometric ratings showed maximum abnormality at times when the patient was so inaccessible as to make psychometric measurements practically impossible (graph 7). This factor of inaccessibility plays a lesser part in the psychiatric ratings. However, in graph 5, there was a period (April) when inaccessibility resulted in a marked increase in this abnormality.

The four graphs showing clinical psychiatric improvement demonstrate the tendency for the basal metabolic rate to approach closest to the normal during, or just subsequent to, insulin shock therapy. There are significant fluctuations following treatment, and in all four cases at the time of discharge this rate had fallen below the highest level reached during the period of observation in hospital. Unfortunately it was not possible to arrange for complete investigation on patients following discharge. In a subsequent series all observations will be made for a period of six months following treatment.

Electroencephalograms on the above eight patients were found to remain fairly constant in quality, with little change from week to week. While there appeared to be slight improvements in some of the recordings, coincident with improvement in mental health, the changes were very slight and may have been due to other causes.

It has not been possible to observe deteriorative changes in the cerebral cortex resulting from insulin shock therapy, as indicated by the electroencephalograph, except in the case of one insulin-resistant patient of an earlier group, who received massive doses of insulin, and is not included in this report.

Three findings have been made on thirty-three schizophrenic patients.

1. As has been previously reported by other workers, it has been found that the quality of the electroencephalographic recordings is consistently lower than the quality found among the normal population.

2. As nearly as can be judged from this small number of patients, the electroencephalograms of the schizophrenics, apart from their rather low quality noted above, are representative of the population as a whole. No particular type of record appears to predominate.

3. The records of five of the patients observed had a fast frequency that was greater than average (sixteen per second and up). All five patients were catatonics showing marked psychomotor inertia. A larger series of such catatonics is being observed to ascertain the frequency in such patients of this electroencephalographic abnormality.

Summary

This paper attempts to illustrate a method of quantitatively assessing certain psychological, psychiatric and physiological changes occurring in a group of schizophrenic patients, before, during and after insulin shock therapy. These changes have been recorded in such a way as to permit their graphic presentation, except the electroencephalographic observations which in this series happen not to lend themselves to this type of presentation. Subsequent electroencephalographic observations suggest that it will be possible to include their graphic presentation in a later report. The paper represents an effort to correlate simultaneous observations on a small group of schizophrenic patients, and suggests a fair correlation between the clinical psychiatric rating, psycho-

metric rating and a lesser correlation between these two observations and the basal metabolic rate.

Five catatonics in this small group, showing marked psychomotor inertia, suggest that such patients show an abnormal fast frequency in the electroencephalogram.

Further work is now in progress to include sugar and insulin tolerance observations along with the basal metabolic rate, psychometric, psychiatric and electroencephalographic observations in a larger series than that presented in this paper.

BIBLIOGRAPHY

1. Hoskins, R. G.: Archives of Neurology and Psychiatry, **38**: 1261, 1937.
2. Davis, P. A.: Journal of Neurophysiology, **4**: 92-114, 1941.

ELECTROENCEPHALOGRAMS OF MANIC-DEPRESSIVE PATIENTS[1]

By PAULINE A. DAVIS, M. A., Boston, Mass.

Introduction

From October 1936 through July 1940, EEGs were recorded on 244 patients at McLean Hospital. Many of these patients were recorded a number of times during this period. Only the EEGs taken before any form of shock treatment was begun are considered herein. Those patients who within a year of the time their EEGs were recorded carried the diagnosis of manic-depressive psychosis constitute the group of 81 patients which is the basis of this study. Of this group 52 patients were diagnosed as manic-depressive depressed (MDD), 22 as manic-depressive manic (MDM), and 7 as manic-depressive mixed (MD mixed).

This research was undertaken to discover (a) whether the EEGs of MD patients change when they shift from the depressed to manic phase or *vice versa*, and (b) whether their personality or characteristic behavior, regardless of their diagnostic classification, is related to their fundamental EEG patterns.

Findings

There appears to be very little change in the EEGs when patients diagnosed as MDD or MDM shift from one phase to the other or when they shift to what may be regarded as a more normal condition. If the central nervous system is physiologically disturbed enough to cause a disturbance in the level of consciousness, slow waves may be present to a varying degree within the EEG.

Fig. 1 is the EEG of an MDD patient, 40 years of age, recorded when he was in a very manic phase, but not confused. He was thoroughly conscious and aware of his manic state. He continued in this condition for months. This phase then subsided and he shifted directly into an extremely depressed state in which he was mute for months, though not confused or retarded. No slow waves indicative of a disturbance in the level of consciousness are to be seen in this patient's EEGs. There is remarkable similarity between the EEGs taken during the two different phases of his psychosis.

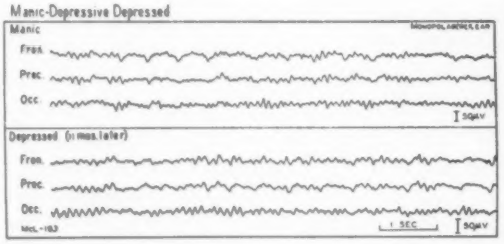


Fig. 1.

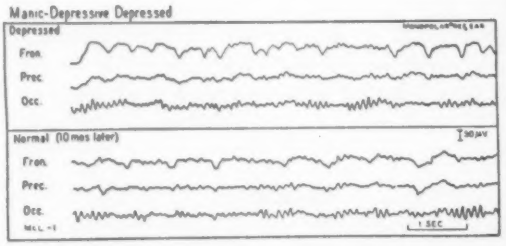


Fig. 2.

Another patient, a woman, also diagnosed as MDD, serves to illustrate a shift from extreme depression, in which she was weeping and suicidal, to a condition which appeared to be very normal, but not manic. She became cheery, sociable and witty. Fig. 2 represents EEGs taken when she was extremely depressed and suicidal, and later when she was completely out of this phase and essentially normal. No increase in slow waves developed in her EEG at either time, nor was she retarded or confused.

An MDM patient whose behavior was one of mental overactivity, and whose speech revealed an interruption in her rapid train of thought and disorientation, which she

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Virginia, May 5-9, 1941.

From McLean Hospital, Waverley, Mass., and the department of physiology, Harvard Medical School, Boston, Mass.

Aided by a grant from the Josiah Macy, Jr., Foundation.

tried desperately to overcome, presents quite a different picture. The EEG recorded at this time is contrasted with the EEG taken on the day she was discharged as well (Fig. 3). Her state of consciousness was slightly impaired as evidenced by her inability to become oriented. In her EEG slow-wave activity interfering with her basic pattern was present during her manic phase. This slow-wave interference was lacking when she was recorded on the day of her discharge.

The EEGs of these MD patients do not show any significant change with changes of phase in their psychoses, except when the state of consciousness is altered.

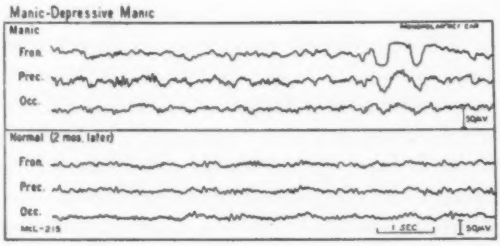


FIG. 3.

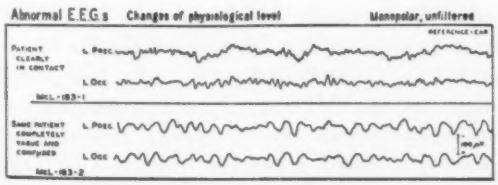


FIG. 4.

An illustration of a more extreme change in the level of consciousness, in which there is confusion or retardation, can be seen in Fig. 4. This EEG represents a spontaneous disturbance of consciousness in a patient whose psychosis was undiagnosed at the time this EEG was recorded. Slow-wave activity completely blotted out his characteristic, or basic, EEG activity during the period when he was extremely confused. When he became clear again, weeks later, his characteristic EEG activity returned, the slow-wave activity disappearing almost completely.

Among the MD patients there may be changes in their EEGs for short periods in which slow activity is recorded from one area, while another part of the brain is functioning perfectly normally. Nevertheless, this is more characteristic of people with conditions related to cerebral dysrhythmias associated with epilepsy (Gibbs, F. A., Gibbs, E. L., and Lennox, W. G.)(1) and is not related specifically to manic-depressive psychoses. An MD patient, whether manic or depressed, may become very confused and reveal evidence of physiological disturbance as profound as that presented in Fig. 4, but it is independent of his MD psychosis.

There are a number of patients among the MD group showing erratic slow-wave disturbances in parts of their EEG patterns, as has been stated. Their behavior is unpredictable and erratic, and they develop periods of confusion. Their EEGs cannot be differentiated, however, from Group II of the schizophrenic patients who were previously studied (Davis, P. A., 1940)(2), or from the EEGs of known epileptics. The group of MD patients who reveal these abnormal episodes of dysrhythmic activity are the more unstable members of the total group of patients. They become noisy or destructive on the wards and often require special nursing, or isolation or restraint. They will be stable for periods of time, then become unstable whether or not they are in a manic or depressed phase.

The types of EEG patterns of the MDD and MDM patients were classified according to the scheme outlined in a recent paper by the author (1941)(3). By "pattern" is meant the activity of the brain which is characteristic of the individual, *not* the abnormalities which may interfere with the person's fundamental brain activity. The abnormal interferences come and go, superimposing themselves on and sometimes even completely obscuring the individual's characteristic activity, as illustrated in Fig. 4. The various types of patterns are as follows:

An *A* type of pattern is dominated by alpha waves (approximately 10 per sec.).

A *B* type of pattern is notably lacking in alpha waves.

An *MF* type of pattern shows alpha activity with fast waves.

An *MS* type of pattern consists of alpha and slightly slower waves.

An *M* type of pattern is composed of mixed frequencies covering a wide range of slow, alpha

and fast waves diffusely represented throughout, no one of which becomes dominant.

The alpha frequencies of all EEGs in this series were also counted and the average voltages determined, as defined in a recent paper by the author (1941)(3).

It will be seen from Table 1 that the majority of patients in the MDD group have *A* or *MS* patterns, whereas in the MDM group the majority have *MF* patterns. There is an indication that the MDD group tend toward EEG activity on the slow side of the frequency range, and that the MDM group tend toward activity on the fast side, even though there is overlap and spread in the distribution.

TABLE 1

DISTRIBUTION OF EEG PATTERNS, ALPHA FREQUENCIES, AND VOLTAGES BETWEEN MANIC-DEPRESSIVES DEPRESSED, MANIC-DEPRESSIVES MANIC AND MANIC-DEPRESSIVES MIXED

	MDD		MDM		MD mixed		
	No.	Per cent	No.	Per cent	No.	Per cent	Total No.
Patterns:							
A	22	42	3	14	4	58	29
B	4	8	3	14	1	14	8
MF	3	6	12	54	1	14	16
MS	9	17	0	0	0	0	9
M	14	27	4	18	1	14	19
Total ..	52	100	22	100	7	100	81
Frequencies:							
8.5-9	7	13	0	0	0	0	7
9-10	14	27	4	18	1	14	19
10-10.5 ..	25	48	12	55	4	57	41
10.5-11 ..	0	0	0	0	0	0	0
11-12	5	10	6	27	1	14	12
Total ..	51 *	98 *	22	100	6 *	85 *	79
Voltage:							
Low	18	34	6	27	4	58	28
Average .	29	56	16	73	3	42	48
High	5	10	0	0	0	0	5
Total ..	52	100	22	100	7	100	81

* One case in MDD and one in MD mixed were uncountable for frequency of alpha.
Alpha and voltage defined according to the recent paper of the author (1941).
Under voltage, low=10-30 μV., avg.=30-80 μV., high=over 80 μV.

The particular factor of alpha frequency shows a similar correlation. The commonest alpha frequency range in normal individuals is 10 to 10.5 per second. Table 1 shows that the MDD group tend to have alphas of 10 to 10.5 or slower, and that the MDM group, when not in the usual 10 to 10.5 range, most often fall in the fastest alpha range (11 to 12 per second). The tendency of the MDMs toward fast alpha is the opposite of the tendency toward slow alpha frequencies that characterizes the MDD group.

There appears to be a statistically significant difference between the fundamental types of EEG patterns in the MDD and MDM groups of patients, and even in the direction of spread in the alpha frequency range when diverging from the most common frequency of 10 to 10.5 cycles.

Inquiry was then made into the histories of this group of patients as given in the anamneses, in order to discover how the personalities and behavior of these patients were characterized by the people who knew them before they became psychotic. Even though the characterizations in the histories showed overlap, there is a definite indication that the MDD group of patients, if one excludes those given the diagnosis of "agitated depression," appear to be different temperamentally from the MDM group. The MDD as a group appear fundamentally to be the passive, dependent type of individual, whereas the MDM group are more likely to be described as active, energetic and independent. Those given the diagnosis of "agitated depression" are found to be unsettled, restless, tense individuals. The activities of the two groups may be similar, but their reactions to their activities indicate different attitudes.

If the previous histories of these patients are considered apart from their diagnoses, there is a definite correlation between their characteristic behavior in life and their EEG patterns. The passive, quiet, relaxed, inhibited patient is found more frequently to have an *A* or *MS* pattern with a 10 cycle or slower alpha, and the active, energetic, tense, or agitated patient is found to have an *MF* or *B* pattern with a 10 cycle or faster alpha.

DISCUSSION

What is quite apparent from these data is that there are factors which have not yet

been discovered which must account for the shifts in the manic-depressive phases when the level of consciousness is still unimpaired. The EEGs have not yet yielded data concerning these unknown factors.

Previous longitudinal studies which have been in progress for more than 5 years have shown a definite correlation between passive, dependent types of individuals and *A* patterns, and between aggressive or active, independent individuals and *MF* or *B* patterns. The first psychophysiological correlation was reported in 1937 (Saul, Davis, and Davis)(4). Since that time, however, an increasing body of evidence not yet published has been accumulated by the author, confirming the correlation of personality and the character of physiological activity of the central nervous system as revealed by the EEG. It is the author's belief that if a person with an *A* pattern should develop MD psychosis he will be more apt to be diagnosed as an MDD. If he has an *MF* or *B* pattern composed of fast frequencies, he will be more apt to be given a diagnosis of "agitated depression" or MDM.

The data presented seem to support this belief, which in turn has developed from other studies now in progress, and may account in part for the fact that *as long as the level of consciousness is not impaired,* the EEG does not change as an individual shifts from the manic to depressed phase in his psychosis.

Summary

The EEGs of 81 manic-depressive patients of whom 52 were diagnosed as manic-depressive depressed (MDD), 22 as manic-depressive manic (MDM), and 7 as manic-depressive mixed (MD mixed) were recorded and analyzed. Findings reveal that there is very little change in the EEGs when patients diagnosed as MDD or MDM shift from one phase to another except when the level of consciousness is altered.

Those patients whose EEGs show erratic slow wave disturbances are those whose behavior is unpredictable, regardless of diagnosis.

The majority of the MDD group have *A* or *MS* patterns with alpha frequencies of 10 cycles or slower. The MDM majority of the MDM group have *MF* patterns with alpha frequencies 10 cycles or faster.

Previous studies show a correlation between passive, dependent types of individuals and *A* patterns, and between agressive, active, independent individuals and *MF* or *B* patterns.

It is the author's belief that if a person with an *A* pattern should develop MD psychosis he will be more apt to be diagnosed as MDD. If he has an *MF* or *B* pattern composed of fast frequencies he will be more apt to be diagnosed as MDM or as "agitated depression."

The EEGs have not yet yielded data concerning the factors responsible for the shifts in the manic-depressive phases when the level of consciousness is still unimpaired.

BIBLIOGRAPHY

1. Gibbs, F. A., Gibbs, E. L., and Lennox, W. G.: The likeness of the cortical dysrhythmias of schizophrenia and psychomotor epilepsy. Am. J. Psychiat., 95: 255-269, 1938.

2. Davis, P. A.: Evaluation of the electroencephalograms of schizophrenic patients. Am. J. Psychiat., 96: 4, 1940.

3. Davis, P. A.: Technic and evaluation of the electroencephalogram. J. Neurophysiology, January 1941.

4. Saul, L. J., Davis, H., and Davis, P. A.: Correlation between electroencephalograms and the psychological organization of the individual. Trans. Am. Neurol. Assn., 167-169, 1937.

EVALUATION OF THE RESULTS OF PSYCHOANALYTIC THERAPY[1]

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A reproach frequently directed against psychoanalysts is that they do not publish reports on the results of their therapy. This criticism is in some degree valid, for to the knowledge of the writer there is not a single report in the literature on the therapeutic results of an analyst in private practice, or of any group of such analysts. However, there are brochure reports of the results of 592 analyses conducted at the Berlin Psychoanalytic Institute(1) from 1920 to 1930, 74 cases at the London Clinic of Psychoanalysis(2) from 1926 to 1936, and 157 cases at the Chicago Institute for Psychoanalysis(3) from 1932 to 1937. Also, there are the important reports by Hyman and Kessel(4) in 1933 and later by Hyman(5) in 1936 of 43 cases referred by them to psychoanalysts, and the selective study by Jameison and McNiel(6) in 1938 of 17 unsuccessful cases which had to be hospitalized. It is the purpose of this paper to review and evaluate the valid and invalid factors which operate against the reporting of results by psychoanalysts, to present a report on 100 cases treated by psychoanalysis at the Menninger Clinic from 1932 to 1941, and to show a composite table of all these reports, which include almost 1,000 cases.

The Difficulties Involved in Reporting Results of Psychoanalytic Therapy

The Berlin Institute report of 1930, compiled by Fenichel, does not discuss the specific difficulties encountered. Since this was the first published report of results, diagnoses were listed as simply as possible and more or less arbitrary and subjective criteria of improvement were employed. In the next report, that of the London Clinic in 1936, written by Jones, there was no real attempt at statistical reporting, and only a general semi-statistical summary was given. Jones, in discussing the problems of reporting, says: "The reasons why psychoanalysts attach little value to therapeutic records in the field of psychopathology are well known: the sharp distinction they make between symptomatic improvement and modification of the underlying disorder itself, the impossibility of using comparable criteria, and their far higher standards of what constitutes mental normality than those accepted by other physicians." He goes on to make the point that even in a ten year period, involving 738 patients presenting themselves for consultation, an extremely small number of psychoanalytically treated cases in each diagnostic category developed—far too small a number to be of much significance statistically.

In the five year report of the Chicago Institute (1932-37) Alexander discusses more fully the difficulties encountered in diagnosis, record-keeping and evaluation of results. He mentions the well known factors of the long duration of psychoanalytic treatment, the difficulty of recording data and material derived from many hundreds of hours with various patients, the less tangible symptoms in psychopathology as compared to organic pathology, and the fact that even the intangible symptoms are often of secondary importance as compared with the still less tangible disturbances of the whole personality. He points out that the disappearance of manifest and well-defined symptoms can be used as a sign of cure in only a limited number of cases, that any criteria for judging therapeutic results are necessarily vague and abstract and require subtle and expert judgment, and states that standard criteria for such judgment are lacking. He reminds us that the conditions treated by psychoanalysis are very complex and diversified and often include combinations of a number of different diagnostic entities. Also cases within any particular category may be of varying degrees of severity. In evaluating the often rather

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association at a joint session with the section on psychoanalysis, Richmond, Va., May 5-9, 1941.

subtle changes in the personality which psychoanalysis seeks to effect, other difficulties are encountered. The analyst must remember that the *post hoc ergo propter hoc* fallacy must be avoided; life situations that become altered may result in marked personality changes and relief of symptoms, and also spontaneous remissions are possible in some cases. Relatives and friends of the patient also may have somewhat unreliable opinions as to the value of the personality changes in the psychoanalytically treated patient. Individuals in close contact with the patient usually stand in a special emotional relationship to him, and, as a matter of fact, all psychiatrists are aware that relatives of the patient may have reasons for actually preferring that the patient remain in his neurotic state, so that valid progress in his mental functioning may arouse unfavorable comment or even actual antagonism toward the analysis and the analyst. Alexander concludes that the analyst and the patient are in the best position to judge the actual progress made and the weights to be assigned to analytic insight and altered life situation in evaluating the therapeutic result.

The writer wishes to call attention to several other factors to be taken into account in any attempt to compile therapeutic reports on pyschoanalytically treated cases. Psychonanalysis can be (and is) utilized by analysts of varying degrees of experience and proficiency. Theoretically, better results should be obtained when well trained, experienced analysts treat types of cases for which they are especially suited by temperament and by specific experience. In spite of all references to psychoanalysis as *a* method of treatment, or to *orthodox technique,* psychoanalysis remains a therapeutic procedure which, when compared to such a definite medical procedure as administering insulin to a diabetic on a calculated diet, or such a surgical procedure as performing a gastro-enterostomy, is relatively unstandardized. Just as every psychoanalytic patient is a distinctly different case, so each psychoanalyst, trained though he be in the standard techniques of conducting an analysis, is still an individual with certain talents and a certain temperament who attempts to cope with the subjective complexities of each patient by attempting to apply the psychoanalytic technique. Hence any report of the therapeutic results of *psychoanalysis as a treatment method* is actually a composite of the results of various individual analysts of varying degrees of experience and skill with cases of varying degree of severity. While these variables are present in some degree in all medical and surgical procedures as well, they are probably never present in anything like the degree of significance found in psychoanalysis.

The nosological categories in psychiatry are at the present time unstandardized in spite of continued attempts to achieve definitive conceptions and labels for clinical conditions. Physicians strive for a single diagnosis that includes all the symptoms and signs, but must often list also the complicating conditions. Psychiatrists and psychoanalysts also strive for such a single clinical diagnosis, but are handicapped by a still present (although perhaps decreasing) nonunanimity of viewpoint as well as by diverse systems of nomenclature. The standard nomenclature adopted by The American Psychiatric Association is quite useful in making statistical studies, but it still awaits more refined and accurate category differentiation. It is extremely difficult to make an all-inclusive case diagnosis—one that describes the psychopathological condition itself as well as the general psychodynamic structure of the character of the patient. Thus, in compiling a statistical report, one is confronted constantly with the problem of where to list many "mixed" cases; how to classify a case (for example) of a person of rigid obsessional character who has strong paranoid trends, presents an anxiety state as the clinical condition from which he seeks relief, and also has some psychogenic physical symptoms which he attributes to having had jungle fever ten years before.[2] In general medicine there is no comparable confusion, for there is not the same attempt to diagnose the entire physio-chemical structure of the patient, nor, furthermore, the same attempt to treat many other conditions subordinate to the main illness. Hence,

[2] This is an actual case, finally listed in the card index as "Obsessional neurosis."

in psychoanalytic reporting, there is a factor of unavoidable error in listing diagnoses at all.

The above cited difficulties may be responsible for the fact that much of the psychoanalytic literature dealing with case reports is discovered to contain intensive studies of case material, psychodynamic interpretations and metapsychological conclusions, with the exact part played by the analyst and the therapeutic outcome of the case frequently omitted entirely. The impression is conveyed to the reader or listener that some abstract, mysterious "process of psychoanalysis" operates to produce the analytic material and bring about whatever success results. Such accounts justifiably arouse skepticism and criticism among nonanalytic psychiatrists and physicians.

A further reason of dubious validity operating against psychoanalytic reporting is the viewpoint held by some analysts that psychoanalysis is not an instance of medical therapeusis but a confidential personal matter between patient and analyst, which exempts the analyst from the usual medical obligation to report methods and results. The writer believes, however, that if psychoanalysis is to attain its rightful place as a valuable scientific therapy among the medical therapies, its exponents must recognize the necessity of reporting the technique used and the results obtained. The reporting of failures is also almost absent from the literature, although medicine in general, contrary to the lay opinion that physicians "bury their failures," publishes failures of cure and deaths for the scientific value of such data in the general body of medical literature. Much can be learned from such failures, and no stigma can rationally be attached to the physician doing the reporting, whether he be surgeon, internist, psychiatrist or psychoanalyst. One further factor operating against the making of therapeutic reports by psychoanalysts is probably the relatively much higher proportion of time, effort and study required per patient reported as compared to general medical reporting of cases treated. This element is, however, inherent in the type of practice, and is insufficient reason to refuse to attempt to compile therapeutic records.

The Aims of Psychoanalytic Therapy, Its Limitations, and Criteria for Evaluating the Results

The aims of psychoanalytic therapy and the psychodynamic theories regarding the modus operandi of psychoanalysis were fully discussed in a symposium on therapeutic results at the International Congress at Marienbad in 1936 by Glover, Fenichel, Strachey, Bibring, Bergler, Numberg and others.(7) This excellent discussion will not be reviewed here, nor did the symposium discussions include any recommendations for the criteria to be used in evaluating the results. Any general statement of the aims of psychoanalytic therapy, however, in nontechnical language, would undoubtedly include the following:

1. *Disappearance of the presenting symptoms*

2. *Real improvement in mental functioning*

a. The acquisition of insight, intellectual and emotional, into the childhood sources of conflict, the part played by precipitating and other reality factors, and the methods of defense against anxiety which have produced the type of personality and the specific character of the morbid process

b. Development of tolerance, without anxiety, of the instinctual drives

c. Development of ability to accept one's self objectively, with a good appraisal of elements of strength and weakness

d. Attainment of relative freedom from enervating tensions and talent-crippling inhibitions

e. Release of the aggressive energies needed for self-preservation, achievement, competition and protection of one's rights

3. *Improved reality adjustment*

a. More consistent and loyal interpersonal relationships with well-chosen objects

b. Free functioning of abilities in productive work

c. Improved sublimation in recreation and avocations

d. Full heterosexual functioning with potency and pleasure

Certain limitations, however, are imposed on the attainment of these aims in spite of the best application of the method of psychoanalytic therapy. (1) The intelligence level

of the patient is a limiting factor. It may apparently be raised in some cases by lifting conflicts which interfere with intelligence functioning, but the native intelligence endowment cannot be increased. (2) Likewise there are definite limitations in respect to native ability. Talents cannot be instilled. Occasionally some new abilities may blossom forth in a patient when his instinctual energy is freed from the shackles of anxiety and inhibition, but it cannot be a regular expectation that psychoanalyzed patients will come to possess talents which they did not have before. (3) There are also limitations imposed by physical factors of size, muscular and skeletal development, personal attractiveness and specific handicaps of physical anomalies, sequelæ of previous disease or injury, etc., which will affect in many ways the patient's full attainment of success in life. (4) Many emotional disorders are so deep-rooted, so early in their onset, that any improvement, even by the most thoroughgoing and successful psychoanalysis, can be only relative. The ego, or functioning, executive part of the psyche may be said to be crippled, just as the skeletal structure may be crippled by rickets or injury, the muscular structure by anterior poliomyelitis, or the organ integrity by rheumatic fever or malignant growth. (5) And finally, life and reality impose frustrations, stresses, privations and all sorts of difficulties against which the patient must do battle in spite of all he learns in psychoanalysis. The best analyzed patient might still relapse under a special stress, just as might any apparently quite normal person who had never had a neurosis nor been analyzed. (6) It probably goes without saying that the economic status of the patient imposes definite limitations on what he may accomplish—whether there be too little or too much money.

One might conclude from a consideration of these and other limitations that it is an entirely illogical and unfair expectation for the patient, his friends, relatives or referring physician to anticipate that after being treated by the method of psychoanalysis he will become a paragon of all the virtues and accomplishments, without flaw, defect or anxiety and capable of behaving in every possible situation like a super-man. Yet psychoanalytic therapy is often judged by these very criteria. One might as well expect that psychoanalysis would also cure his freckles, his bad golf swing and his aversion to turnips. No, the patient will remain essentially the same person after the best analysis—rid of his disabling symptoms, perhaps, or able to handle what ones are still left, more adaptable, more productive, happier in his relationships, but still the same person as to native endowment, appearance and basic temperament. Another invalid criterion for judging therapeutic success was advanced by Hyman and Kessel in their report—a criterion which the editors of the J.A.M.A. saw fit to refute in an editorial(8). This was that a patient who was having difficulty adjusting to an unsuitable marital partner should, after being analyzed, be able to make a happy adjustment to this same marital partner. The editorial pointed out that the neurotic choice of a marital partner might well be a part of the neurosis, and improvement in the neurosis might lead inevitably and logically to a changed marital status. Also, the expectations and requirements of the patient or referring physician at the beginning of treatment could not be a fair criterion of the success of the treatment, since the patient's expectations and demands might also be elements of his emotional disorder. Actually, however, as the editorial pointed out, divorce following an analysis is an exception, and cases where it has occurred have been cited by critics to the exclusion of the many patients who achieve a much better marital status with the same partner through psychoanalysis.

Psychoanalysts and psychiatrists undoubtedly should establish reasonable standard criteria for improvement in patients treated by various psychiatric therapies. Since the aims in psychoanalysis are considerably higher than in psychiatric hospital therapy, for example, it is reasonable that the criteria for judging such a long and intensive mode of therapy as psychoanalysis should be more exacting. The writer wishes to suggest five such reasonable criteria for measuring the success of an analysis, the patient's own limitations, the severity of his illness and the

duration of the analysis always being taken into account also:

1. Symptomatic recovery; *i.e.,* relative freedom from or significant diminution of disabling fears, distress, inhibitions, dysfunctions, etc.

2. Increased productiveness, with improved disposition of his aggressive energies in his work

3. Improved adjustment to and pleasure in his sexual life

4. Improved, less ambivalent, more consistent and loyal interpersonal relationships

5. Achievement of sufficient insight to handle ordinary psychological conflicts and reasonable reality stresses

The writer would like to propose that these, or some modification of these criteria become the subject of further discussion by psychiatrists and psychoanalysts, to the end that after comparable standardization of diagnostic categories is effected, psychoanalysts in private practice might pool their therapeutic results for publication, and thus permit significant contributions to the literature of therapeutic successes and failures with various clinical conditions.

Statistical Reports

Since standardized and entirely acceptable diagnostic categories and therapeutic criteria have not been established, and since, in order to present the statistics available, the categories and criteria employed must be utilized, the following reports will use a combination of the categories and criteria devised by the Berlin and Chicago Institutes. The individual cases reported by the London Clinic and by Hyman and Kessel which could be identified as to diagnosis and result have been included. Sixteen children and several other cases reported generally from the London Clinic had to be omitted for lack of information, as did 3 behavior problem cases in adolescents reported by Hyman and Kessel, and 10 subsequent cases referred for analysis and reported by Hyman. The 47 cases of unsuccessful results of psychoanalytic therapy reported by Jameison and McNiel, while a valuable study, could not fairly be included since these cases were selected from a certain viewpoint.

The diagnostic categories employed are common ones used by all psychiatrists and are not special psychoanalytic terms. Cases reported in the studies mentioned are listed as the authors of these studies listed them. Cases reported from the Menninger Clinic are fitted into the diagnostic category most nearly applicable. The categories on the charts are so arranged that the less severe cases (psychoneuroses) are placed at the top and the more severe cases—alcoholism, psychopathies and psychoses appear at the bottom. The usual medical criteria regarding outcome of treatment are employed—apparently cured, much improved, improved and unchanged or worse. The first group, "apparently cured" is reserved for cases in which a definite and complete recovery occurred which could be attributed only to psychoanalytic therapy. The second group, "much improved," includes those cases in which improvement was considerable and was attributable to the analysis, but in which the analyst felt that a complete cure was lacking in some respects. These two groups are combined to provide the number regarded as successful results of psychoanalytic therapy. The third category, "improved" includes those patients who were slightly or only moderately better at the end of the treatment, but in whom the improvement was of lesser degree and might be attributable to other factors than the treatment. The fourth category, "no change or worse" is self-explanatory. These two groups are combined to furnish the total number regarded as the unsuccessful.

Wherever sufficiently large numbers of cases are found, percentages based on the number treated for at least six months are calculated for the successful and unsuccessful results.[3] Because of the relatively small

[3] In the Berlin, London and Chicago reports, only those cases were included in the calculation of percentages which had been under treatment at least six months. In order to promote uniformity, this same selection was used in the study of the Menninger Clinic cases and, of course, in the composite table. However, the writer is well aware that the excluded cases, *i. e.,* those treated less than six months, represent an important group of "failures." It is emphasized here again that this group deserves special study, statistical analysis and evaluation of the failure factors. Such a study of the Menninger Clinic cases is in prospect.

numbers of cases in specific diagnostic categories, computations are made for the groups of psychoneuroses, of sexual disorders, or organ neuroses, and of psychoses. The last chart is a composite of all the identifiable cases reported including the 100 cases from the Menninger Clinic, reported for the first time in this paper.

Comments on the Tables

1. *Berlin Institute report.*—423 out of 592 cases were cases of psychoneurosis or sexual disorders. Only 89 cases or 15 per cent were alcoholics and psychotics. In the former group of 423 cases 149 or 35 per cent broke off the treatment under six months. Of the remaining 274, whose treatment lasted six months or longer, 62 per cent had successful outcome.

2. *Hyman and Kessel.*—21 out of 29 patients were cases of psychoneurosis or sexual disorder. Of these 21 all but 3 hypochondriacs remained under treatment six months or longer and 88.8 per cent successful outcomes resulted. The 8 psychotic cases were all treated over six months and all were failures. It might be pointed out that analysis of such cases in private practice offers much less chance of success than combined psychoanalysis and sanitarium care.

3. *London Clinic report.*—Here again a charity outpatient clinic shows a preponderance of cases of psychoneurosis and sexual disorders—59 out of 74 or about 80 per cent. The original report did not use the criteria of results employed in the present chart, but as nearly as could be determined, the results showed that slightly less than half of the cases were successfully treated. Of the 15 cases of psychoses, all treated as outpatients, all but one were failures.

4. *Chicago Institute report.*—47 of the 157 cases reported (21 per cent) were diagnosed psychoneurosis or sexual disorder. Of these 35 were treated six months or longer and 62.9 per cent of the psychoneuroses and 50 per cent of the sexual disorders were treated successfully. Of 52 cases of character disorder 39 were treated six months or longer and 71.8 per cent had successful outcomes. The Chicago report is especially interesting because of the larger number of organ neuroses and organic conditions treated than in any other report. Of 43 cases, 27 were in analysis a minimum of six months with 77.7 per cent successful results. The other categories provide numbers too small for significant statistical evaluation.

5. *Menninger Clinic report.*—Of 100 consecutive cases, none of which is still in analysis, 31 were cases of psychoneurosis or sexual disorder. All but one were treated at least six months with about 80 per cent successful outcome. Eleven more were character disorders and stammering (1 case). Of these 11, 8 were in analysis six months or longer and 5 or 62.5 per cent had successful outcomes. This report is distinguished from the others by the larger number of cases of chronic alcoholism and psychosis treated by psychoanalysis. Many cases of alcoholism and 38 cases of psychosis (58 per cent of the total) were treated with combined sanitarium care and psychoanalysis. Of the 15 alcoholics treated at least six months, one third had successful outcomes. The writer has previously reported 20 cases personally treated (9) but several of these cases were not treated by psychoanalysis. Of the 38 cases of psychosis 30 remained in analysis for at least 6 months and 40 per cent had successful outcomes.

6. *Composite report.*—The figures from all of the previous reports are combined and shown on this chart. The highest percentage of success 78.1 per cent is shown for organ neuroses and organic conditions. Psychoneuroses follow with 63.2 per cent successful cases, character disorders next with 56.6 per cent success, then sexual disorders with 48.5 per cent successful outcome and psychoses last with 25 per cent success.

Conclusion

In this study, the writer has attempted to discuss and summarize the difficulties involved in reporting results of psychoanalytic therapy, presenting the valid and invalid reasons usually involved in preventing the publication of therapeutic results, and has made a plea for and suggestions regarding, standard diagnostic criteria and standard

BERLIN INSTITUTE 1920-30

		No. of cases	Broken off	Six months or longer	Apparently cured	Much improved	Per cent AC+MI	Improved	No change or worse	Per cent I+NC
Psychoneuroses	Anxiety hysteria	57	25	32	14	6		10	2	
	Conversion hysteria	105	31	74	25	21		22	6	
	Anxiety state	....	....	....	....	....		....	....	
	Compulsion neurosis	106	35	71	21	26		18	6	
	Depression	37	13	24	7	5	62	10	2	38
	Hypochondria	4	4	0	....	....		....	....	
	Inhibitions	80	24	56	21	15		15	5	
	Traumatic neurosis	3	0	3	1	....		1	1	
	Neurasthenia and anxiety neurosis	10	7	3	....	1		2	....	
Sexual Disorders	Unclassified	8	3	5	2	1		1	1	
	Homosexuality	8	4	4	1	....		2	1	
	Transvestism	....	....	....	....	....	54·5	....	....	45·5
	Impotence	....	....	....	....	....		....	....	
	Enuresis	5	3	2	2	....		....	....	
	Character Disorders	49	12	37	7	8		17	5	
Organ Neuroses and Organic Conditions	Peptic ulcer	....	....	....	....	....		....	....	
	Gastric neurosis	....	....	....	....	....		....	....	
	Colitis	....	....	....	....	....		....	....	
	Chronic constipation	....	....	....	....	....		....	....	
	Bronchial asthma	2	1	1	....	....		1	....	
	Hay fever	....	....	....	....	....	80	....	....	20
	Skin conditions	....	....	....	....	....		....	....	
	Female disorders	....	....	....	....	....		....	....	
	Endocrine disorders	3	3	0	....	....		....	....	
	Essential hypertension	....	....	....	....	....		....	....	
	Tics	4	2	2	2	....		....	....	
	Unclassified	3	1	2	1	1		....	....	
	Epilepsies	6	5	1	....	....	....	....	1	
	Migraine	....	....	....	....	....	....	....	....	
	Stammering	13	3	10	3	1	....	3	3	
	Chronic alcoholism	5	3	2	1	....	....	1	....	
Psychoses	Psychopathies	23	18	5	1	....		....	4	
	Manic depressive	14	5	9	1	2		4	2	
	Paranoia	2	1	1	....	1	23·4	....	....	76.6
	Schizophrenia and schizoid	45	26	19	1	2		8	8	
	Totals	592	229	363	101	90	52.6	115	51	47·4

HYMAN AND KESSEL

		No. of cases	Broken off	Six months or longer	Apparently cured	Much improved	Per cent AC+MI	Improved	No change or worse	Per cent I+NC
Psychoneuroses	Anxiety hysteria	1	....	1	....	1		....	....	
	Conversion hysteria	....	....	....	....	....		....	....	
	Anxiety state	5	....	5	2	2		....	1	
	Compulsion neurosis	....	....	....	....	....		....	....	
	Depression	....	....	....	....	....		....	....	
	Hypochondria	3	3	0	....	....		....	....	
	Inhibitions	7	....	7	2	5		....	....	
	Traumatic neurosis	....	....	....	....	....		....	....	
	Neurasthenia and anxiety neurosis	3	....	3	....	2	88.8	....	1	11.2
Sexual Disorders	Unclassified	1	....	1	....	1		....	....	
	Homosexuality	1	....	1	1	....		....	....	
	Transvestism	....	....	....	....	....		....	....	
	Impotence	....	....	....	....	....		....	....	
	Enuresis	....	....	....	....	....		....	....	
	Character Disorders	....	....	....	....	....	....	....	....	....
Organ Neuroses and Organic Conditions	Peptic ulcer	....	....	....	....	....	....	....	....	....
	Gastric Neurosis	....	....	....	....	....	....	....	....	....
	Colitis	....	....	....	....	....	....	....	....	....
	Chronic constipation	....	....	....	....	....	....	....	....	....
	Bronchial asthma	....	....	....	....	....	....	....	....	....
	Hay fever	....	....	....	....	....	....	....	....	....
	Skin conditions	....	....	....	....	....	....	....	....	....
	Female disorders	....	....	....	....	....	....	....	....	....
	Endocrine disorders	....	....	....	....	....	....	....	....	....
	Essential hypertension	....	....	....	....	....	....	....	....	....
	Tics	....	....	....	....	....	....	....	....	....
	Unclassified	....	....	....	....	....	....	....	....	....
	Epilepsies	....	....	....	....	....	....	....	....	....
	Migraine	....	....	....	....	....	....	....	....	....
	Stammering	....	....	....	....	....	....	....	....	....
	Chronic alcoholism	....	....	....	....	....	....	....	....	....
Psychoses	Psychopathies	1	....	1	....	....		....	1	
	Manic depressive	4	....	4	....	....		....	4	
	Paranoia	....	....	....	....	....	0	....	....	100
	Schizophrenia and schizoid	3	....	3	....	....		....	3	
	Totals	29	3	26	5	11	....	....	10	....

LONDON CLINIC 1926-36

		No. of cases	Broken off	Six months or longer	Apparently cured	Much improved	Per cent AC+MI	Improved	No change or worse	Per cent I+NC
Psychoneuroses	Anxiety hysteria	31	....	31	13	4		13	1	
	Conversion hysteria									
	Anxiety state	....	....	....	....	....		....		
	Compulsion neurosis	17	....	17	4	4		7	2	
	Depression	....	....	....	....	....		....		
	Hypochondria	....	....	....	....	....		....	....	
	Inhibitions	....	....	....	....	....		....	....	
	Traumatic neurosis	....	....	....	....	....		....	....	
	Neurasthenia and anxiety neurosis	....	....	....	....	....	47.4	....		52.6
Sexual Disorders	Unclassified	....	....	....	....	....		....		
	Homosexuality	3	....	3	....			3		
	Transvestism	....	....	....	....	....		....		
	Impotence	8	....	8	3	....		5		
	Enuresis	....	....	....	....	....		....		
	Character Disorders									
Organ Neuroses and Organic Conditions	Peptic ulcer	....	....	....	....	....	....	....	....	....
	Gastric neurosis	....	....	....	....	....	....	....	....	....
	Colitis	....	....	....	....	....	....	....	....	....
	Chronic constipation	....	....	....	....	....	....	....	....	....
	Bronchial asthma	....	....	....	....	....	....	....	....	....
	Hay fever	....	....	....	....	....	....	....	....	....
	Skin conditions	....	....	....	....	....	....	....	....	....
	Female disorders	....	....	....	....	....	....	....	....	....
	Endocrine disorders	....	....	....	....	....	....	....	....	....
	Essential hypertension	....	....	....	....	....	....	....	....	....
	Tics	....	....	....	....	....	....	....	....	....
	Unclassified	....	....	....	....	....	....	....	....	....
	Epilepsies	....	....	....	....	....	....	....	....	....
	Migraine	....	....	....	....	....	....	....	....	....
	Stammering	....	....	....	....	....	....	....	....	....
	Chronic alcoholism	....	....	....	....	....	....	....	....	....
Psychoses	Psychopathies	....	....	....	....	....		....		
	Manic depressive	7	....	7	1	....		5	1	
	Paranoia	1	....	1	....	....	6.7	1	....	93.3
	Schizophrenia and schizoid	7	....	7	....			6	1	
	Totals	74	....	74	21	8	....	40	5	....

CHICAGO INSTITUTE 1932-37

		No. of cases	Broken off	Six months or longer	Apparently cured	Much improved	Per cent AC+MI	Improved	No change or worse	Per cent I+NC
Psychoneuroses	Anxiety hysteria	16	6	10	4	1		3	2	
	Conversion hysteria						....	....		
	Anxiety state	....	....	....	....	....		....		
	Compulsion neurosis	8	1	7	1	3		3	....	
	Depression	10	1	9	3	4	62.9	2	....	37.1
	Hypochondria	....	....	....	....	....		....		
	Inhibitions	....	....	....	....	....		....	....	
	Traumatic neurosis	....	....	....	....	....		....	....	
	Neurasthenia and anxiety neurosis	1	....	1	....	1		....	....	
Sexual Disorders	Unclassified	12	4	8	3	1	50	2	2	50
	Homosexuality	....	....	....	....	....	....	....	....	....
	Transvestism	....	....	....	....	....	....	....	....	....
	Impotence	....	....	....	....	....	....	....	....	....
	Enuresis	....	....	....	....	....	....	....	....	....
	Character Disorders	52	13	39	5	23	71.8	9	2	28.2
Organ Neuroses and Organic Conditions	Peptic ulcer	7	4	3	1	1		1	....	
	Gastric neurosis	4	2	2	1	1		....	....	
	Colitis	7	2	5	4	1		....	....	
	Chronic constipation	6	1	5	2	1		2	....	
	Bronchial asthma	11	6	5	1	3		....	....	
	Hay fever	1	....	1	1	....	77.7	....	....	22.3
	Skin conditions	2	....	2	1	....		....	1	
	Female disorders	2	....	2	1	1		....	....	
	Endocrine disorders	....	....	....	....	....		....	....	
	Essential hypertension	3	1	2	....	1		1	....	
	Tics	....	....	....	....	....		....	....	
	Unclassified	....	....	....	....	....		....	....	
	Epilepsies	4	....	4	1	1	....	....	2	....
	Migraine	1	....	1	1	....	....	....	....	....
	Stammering	1	....	1	....	1	....	....	....	....
	Chronic alcoholism	3	1	2	....	1	....	1	....	....
Psychoses	Psychopathies	....	....	....	....	....		....	....	
	Manic depressive	5	....	5	2	....		....	3	
	Paranoia	....	....	....	....	....	40	....	....	60
	Schizophrenia and schizoid	1	1	0	....	....		....	....	
	Totals	157	43	114	32	45	67.5	25	12	32.5

MENNINGER CLINIC 1932-41

		No. of cases	Broken off	Six months or longer	Apparently cured	Much improved	Per cent AC+MI	Improved	No change or worse	Per cent I+NC
Psychoneuroses	Anxiety hysteria	5	....	5	3	1		1	....	
	Conversion hysteria	1	....	1	....	1		....	....	
	Anxiety state	1	....	1	....	....		1	....	
	Compulsion neurosis	7	1	6	1	3		2	....	
	Depression	4	....	4	....	4	79.3	....	....	20.7
	Hypochondria	1	....	1	1	....		....	....	
	Inhibitions	....	....	....	....	....		....	....	
	Traumatic neurosis	....	....	....	....	....		....	....	
	Neurasthenia and anxiety neurosis	11	....	11	2	7		1	1	
Sexual Disorders	Unclassified	....	....	....	....	....	....	....	....	....
	Homosexuality	....	....	....	....	....	....	....	....	....
	Transvestism	1	....	1	....	1	....	....	....	....
	Impotence	....	....	....	....	....	....	....	....	....
	Enuresis	....	....	....	....	....	....	....	....	....
	Character Disorders	10	3	7	1	3	....	2	2	....
Organ Neuroses and Organic Conditions	Peptic ulcer	....	....	....	....	....	....	....	....	....
	Gastric neurosis	....	....	....	....	....	....	....	....	....
	Colitis	....	....	....	....	....	....	....	....	....
	Chronic constipation	....	....	....	....	....	....	....	....	....
	Bronchial asthma	....	....	....	....	....	....	....	....	....
	Hay fever	....	....	....	....	....	....	....	....	....
	Skin conditions	....	....	....	....	....	....	....	....	....
	Female disorders	....	....	....	....	....	....	....	....	....
	Endocrine disorders	....	....	....	....	....	....	....	....	....
	Essential hypertension	....	....	....	....	....	....	....	....	....
	Tics	....	....	....	....	....	....	....	....	....
	Unclassified	....	....	....	....	....	....	....	....	....
	Epilepsies	....	....	....	....	....	....	....	....	....
	Migraine	....	....	....	....	....	....	....	....	....
	Stammering	1	....	1	....	1	....	....	....	....
	Chronic alcoholism	20	5	15	2	3	33.3	5	5	66.7
Psychoses	Psychopathies	7	1	6	....	....		4	2	
	Manic depressive	14	2	12	2	3		5	2	
	Paranoia	3	....	3	....	1	40	....	2	60
	Schizophrenia and schizoid	14	5	9	2	4		1	2	
	Totals	100	17	83	14	32	55.4	22	16	44.6

COMPOSITE

		No. of cases	Broken off	Six months or longer	Apparently cured	Much improved	Per cent AC+MI	Improved	No change or worse	Per cent I+NC
Psychoneuroses	Anxiety hysteria	216	62	154	59	35		49	11	
	Conversion hysteria									
	Anxiety state	6	....	6	2	2		1	1	
	Compulsion neurosis	138	37	101	27	36		29	9	
	Depression	51	14	37	10	13	63.2	12	2	36.8
	Hypochondria	8	7	1	1	....		....	....	
	Inhibitions	87	24	63	23	20		15	5	
	Traumatic neurosis	3	0	3	1	0		1	1	
	Neurasthenia and anxiety neurosis	25	7	18	2	11		3	2	
Sexual Disorders	Unclassified	21	7	14	5	3		3	3	
	Homosexuality	12	4	8	2	0		5	1	
	Transvestism	1	....	1	....	1	48.5	....	....	51.5
	Impotence	8	0	8	3	0		5	0	
	Enuresis	5	3	2	2	0		....	....	
	Character Disorders	111	28	83	13	34	56.6	25	11	43.4
Organ Neuroses and Organic Conditions	Peptic ulcer	7	4	3	1	1		1	....	
	Gastric neurosis	4	2	2	1	1		....	....	
	Colitis	7	2	5	4	1		....	....	
	Chronic constipation	6	1	5	2	1		2	....	
	Bronchial asthma	13	7	6	1	3		2	....	
	Hay fever	1	0	1	1	....	78.1	....	....	21.9
	Skin conditions	2	0	2	1	....		....	1	
	Female disorders	2	0	2	1	1		....	....	
	Endocrine disorders	3	3	0	....	....		....	....	
	Essential hypertension	3	1	2	0	1		1	....	
	Tics	4	2	2	2	....		....	....	
	Unclassified	3	1	2	1	1		....	....	
	Epilepsies	10	5	5	1	1	....	0	3	....
	Migraine	1	0	1	1	....	....	....	....	....
	Stammering	15	3	12	3	3	....	3	3	....
	Chronic alcoholism	28	9	19	3	4	....	7	5	....
Psychoses	Psychopathies	31	19	12	1	0		4	7	
	Manic depressive	44	7	37	6	5		14	12	
	Paranoia	6	1	5	0	2	25	1	2	75
	Schizophrenia and schizoid	70	32	38	3	6		18	11	
	Totals	952	292	660	183	186	55.9	201	90	44.1

criteria for evaluating the outcome of treatment. A total of 952 cases in which analysis was attempted are listed by diagnosis and therapeutic result. These figures demonstrate, the writer believes, that psychoanalysis must be adjudged an effective therapy for the psychoneuroses, sexual disorders and organ neuroses, and a therapy of some promise in the more difficult field of addictions and psychoses.

BIBLIOGRAPHY

1. Fenichel, Otto: Ten years of the Berlin Psychoanalytic Institute, 1920-30. Report of therapeutic results, pp. 28-40.

2. Jones, Ernest: Decennial report of the London Clinic of Psychoanalysis, May 1926–May 1936. Results of treatment, pp. 12-14.

3. Alexander, Franz: Five-year report of the Chicago Institute for Psychoanalysis, 1932-37 and supplement to the five-year report. Critical evaluation of therapeutic results, pp. 30-43.

4. Kessel and Hyman: The value of psychoanalysis as a therapeutic procedure. J. A. M. A., 101: 1612-15, Nov. 18, 1933.

5. Hyman, H. T.: The value of psychoanalysis as a therapeutic procedure. J. A. M. A., 107: 326-29, Aug. 1, 1936.

6. Jameison and McNiel: Some unsuccessful reactions with psychoanalytic therapy. Am. J. Psychiat., 95: 1421-1448, May 1939.

7. Glover, Fenichel, Strachey, Bergler, Numberg, and Bibring: Symposium on the theory of the therapeutic results of psychoanalysis. Internat. J. Psycho-Analysis, 18: 125-189, April–July 1937.

8. An evaluation of psychoanalysis. Editorial. J. A. M. A., 101: 1643-44, Nov. 18, 1933.

9. Knight, Robert P.: The psychoanalytic treatment in a sanatorium of chronic addiction to alcohol. J. A. M. A., 111: 1443-46, Oct. 15, 1938.

MENTAL DISORDER IN ONE OF A PAIR OF IDENTICAL TWINS[1]

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To appreciate the importance to psychiatry of a study of twins it is obviously necessary to distinguish dizygotic and monozygotic types. Dizygotic twins, which are formed by the union of two eggs and sperms, from the point of view of heredity are no more alike than brother and sister; while monozygotic or identical twins, produced by the union of one egg and one sperm, will have the same inherited characteristics, for they are like one individual split into two. Thus, if the only factor behind any mental disease is an inherited defect, then both identical twins will always show the same type of mental disorder. Rosanoff(12-15), by a mass study of a large number of twins has shown that with a few exceptions, such as Huntington's chorea, this is not the case. In so far as the common types of mental abnormalities are concerned, identical twins may or may not develop the same disorder. This supports the generally held conception that both hereditary and environmental factors are etiologically important. When we find a mental abnormality in one identical twin, we have, by the continued health of the other twin, ruled out the one variable—that of heredity, and have left only the environmental factors to consider. Thus, by a careful study of the life history of the abnormal twin, we can determine in what way it varies from that of the normal twin and we can be relatively certain that if we find any marked difference this is important etiologically. One realizes of course that there is the intrauterine period of which we know nothing and the birth process of which we know very little. We have nevertheless in the case of identical twins the nearest approach to a "controlled" experiment that is possible in the study of mental abnormalities, the healthy twin acting as the so-called control.

To be justified in drawing conclusions from a study of this type we must establish as definitely as possible the diagnosis of their one egg origin. In all the cases reported in this paper I have personally examined both members of each twin pair so that we are not in any way dependent on hearsay for diagnosis. By using criteria set down by Rife, Newman and others (5-6, 8-9), this diagnosis can be established with an extremely high degree of probability. All our twins to be considered as monozygotic, met the following requirements:

1. They must be very much alike in general appearance.

2. They must have identical hair color, texture and form.

3. They must have the same eye color and essentially the same color pattern of iris.

4. They must be moderately similar in make up of eyebrows, eyelashes, shape of ears, shape and articulation of teeth, skin color and texture.

5. Their hands, fingernails and fingers must be essentially the same size and shape.

6. They must agree on the following known hereditary characteristics: (a) Blood group; (b) Presence or absence of hair between first and second joints of the fingers; (c) Taste of phenyl-thio-carbamide.

7. They should show no greater differences in the following quantitative measurements than those found by other workers (Newman)(6) in large groups of normal identical twins: (a) Head length; (b) Head width; (c) Height; (d) Weight; (e) I.Q.

If one twin has been subjected to some environmental influence that may affect any of these features due allowance is made for this in evaluating the findings; *e.g.,* I.Q. where one has had a birth injury.

8. The finger print patterns, *e.g.,* loop, whirl or arch, of each twin have been compared finger by finger with those of the other. The number in agreement is compared with findings given by Hogben(1).

By meeting all the above requirements it is definitely established that in our cases we are dealing with identical monozygotic twins. Abstracts of the histories of five such pairs are herewith presented. In every case one twin remained normal and the other showed the following types of abnormality: (1)

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Va., May 5-9, 1941.

DATA USED IN MAKING DIAGNOSIS OF MONOZYGOTIC ORIGIN OF TWINS

Characteristic	Case I		Case II		Case III		Case IV		Case V	
	Twin A	Twin B	Twin A	Twin B	Twin A	Twin B	Twin A	Twin B	Twin A	Twin B
Head measurement (mm.)	187x148	184x140	156x199	154x200	199x166	198x159	191x157	187x155	.....	.....
Height (cms.)	164.1	159.7	175.5	172.0	179.1	177.8	157.5	175.5	148.6	151.1
Weight (lbs.)	119	103	160	154	155	148	110	120	98	107
Blood group (Moss)	IV	IV	II	II	IV	IV	II	II	IV	IV
Hair between first and second joints of fingers of both hands	Present	Present	Absent	Absent	Present	Present	Present	Present	Absent	Absent
Taste for phenyl-thio-carbamide	Bitter	Bitter	Non-taster	Non-taster	Non-taster	Non-taster	Non-taster	Non-taster	.....	.....
Iris pigmentation	Light blue grey background with inner yellow pigment.		Blue grey background with trace inner yellow pigment.		Blue with trace inner yellow pigment.		Pale blue with inner zone speckled with yellow.		Hazel with central yellow spotting.	
I. Q.	109 Binet	57 Binet	82 Otis	75 Otis	123 Otis	124 Otis	94 Otis	102 Otis	86 Wechsler-Bell.	87
Hair color	Deep reddish brown with natural wave.		Light yellow.		Moderate light blond.		Dark brown with natural wave.		Very dark brown.	
Number of finger-prints same type as corresponding finger in other twin	8		9		9		9		8	

mental deficiency, (2) mental depression, (3) petit mal epilepsy from 8-12 years of age and a psychotic episode at adolescence, (4) grand mal seizures, (5) hysterical attacks simulating epilepsy.

CASE 1.—Mental deficiency in one twin. Twin B, age 13, was examined because of retardation at school work. There was no other problem. Examination by the Stanford Binet shows her to have an I.Q. of 57. Twin A has an I.Q. of 109, and is slightly larger and better developed physically. The head measurements of the normal twin are slightly larger. There were no physical findings of importance. The birth history gives the clue in this case. During labor the mother suffered from two eclamptic seizures. Twin A the normal one, was well down in the pelvis and was delivered without difficulty. Twin B, however, was delivered with considerable difficulty with the use of high forceps. After delivery the head showed a "squeezed" appearance and I feel that injury due to forceps was the cause of the mental retardation, and that Twin B, had she not received the injury at birth, would have been slightly above normal in intelligence instead of a low grade moron. Studies in large groups of identical twins such as those carried out by Newman(6), show that 90 per cent have less than 10 points difference in I.Q.

CASE 2.—Petit mal epilepsy and a psychosis in one identical twin. Twin B is a young man aged 19 with the following history. He was well until 8 years of age at which time he began to have typical petit mal attacks. These were readily controlled by phenobarbital at the age of 12 years. At the age of 19 he had a minor mishap while on the farm, following which he developed psychotic symptoms within a few hours. He became very preoccupied, began to laugh and talk to himself and entirely disregarded any conversation directed toward him. He had difficulty in sleeping and wanted the blinds down and the house in darkness. This condition lasted approximately four months, and was considered to be related to his epilepsy. He has remained perfectly well in the two years that have elapsed since this illness, not showing any signs of epilepsy or psychosis. His identical twin brother has never shown any type of mental abnormality. A history is given of a prolonged mental illness in a paternal aunt. The exact nature of this is not known but from the description given, it was probably schizophrenic. A careful survey of the life history of Twin B fails to reveal any factor that could possibly have any etiological relationship to the epilepsy and the psychotic episode at adolescence. The continued health of the identical twin rules out the possibility that heredity in itself is the cause. There must be some other unknown factor, and this is in keeping with present ideas concerning idiopathic epilepsy.

CASE 3.—Epilepsy in one identical twin. This is a young man aged 20 who has suffered from typical petit mal and grand mal seizures since 13 years of age. These have been relatively frequent, occurring every 2 to 3 days. At the present time they are partially controlled by phenobarbital and dilantin. Despite his malady he has been a very superior student in an honor course at his university. The twin brother has never had any seizures.

The twin with epilepsy was the second born and his birth was a much more difficult one. Following the birth he had a number of convulsions and almost died. He then developed normally until 7 years of age when he had an attack of measles. This illness was severe and during it he was comatose for several hours and was left with a hemiplegia which lasted several days.

At the present time an encephalogram shows a diffuse enlargement of the lateral ventricles. It is of interest to note the relatively large loss of cerebral substance that is not accompanied by any diminution of intelligence, for the twin with the seizures and cerebral atrophy has an Otis I.Q. of 124 and the normal twin 123. It was felt that the brain pathology was the factor underlying this patient's epilepsy. The enlargement of the ventricles, being of a diffuse nature, was presumed to be the result of the measles encephalitis rather than birth injury.

CASE 4.—Affect depression in one identical twin. The patient is a female, age 31 years. When first seen she gave a history of a mental depression of 9 months duration. This had been of gradual onset and relatively severe; the patient had made a half-hearted attempt at suicide. Her thinking was typical of a severe depression; she believed that she had committed the unpardonable sin and called herself all kinds of unpleasant names. She was very agitated, biting her fingernails and driving a car purposelessly about the country. She had lost all interest in food. This illness lasted over a year and the patient made an uneventful recovery and has remained quite well in the two years that have since elapsed. During the illness she was nursed by her twin sister who never showed any symptoms despite this rather trying experience.

There is a family history of mental disorder. The paternal grandmother suffered from two attacks of mental depression which were relatively severe and prolonged. The father was a successful business man for many years but died following business reverses under circumstances suggesting suicide. Both twins developed normally and were moderately successful in their schooling, completing public and high schools and having similar scholastic records. They were brought up in an upper middle class home and were given a very strict, rigid religious and moral training which left them both with inelastic ideas of right and wrong. The twin that eventually suffered from the depression had an experience that upset her and during which she transgressed her rigid moral code and as a result developed very marked feelings of guilt. Following this she stopped working and gradually passed into the depression described above.

This case is of interest because known hereditary and environmental factors are both present. To develop the illness, however, a definite psychological disturbance with feelings of guilt is required to precipitate the psychosis. The other twin, lacking this experience, remained perfectly well. The in-

herited tendency to a breakdown was not enough in itself. This is in keeping with present day views as to the etiology of mental depressions.

CASE 5.—Hysteria in one identical twin. This is a girl, age 15, who gives the history that she had suffered from fainting spells for a period of 6 months. They have occurred on the average of once a day and have always taken place in relation to some emotional disturbance and always when she was with someone else. There has never been any true convulsion, change of color, reflex changes, etc. There was nothing that would characterize an epileptic condition in these attacks described by her family or in those witnessed at the neurological unit of the Boston City Hospital. Electroencephalogram was negative. While in the hospital she developed an inability to walk and an anæsthesia of one leg which was of the stocking type and varied from day to day. The case was regarded as one of hysteria. The identical twin has never shown any such symptoms.

This patient comes from a home where there is a large number of younger children living in very congested quarters under poor economic circumstances. The father is an alcoholic and abuses both the mother and the children. There were numerous instances when the whole family had to combine forces to protect the mother. Now since both twins are exposed to the same environment the question is naturally raised as to why one should break down and the other not. I feel the answer is to be found in the personality make-up of the two twins. Although identical twins are very similar in their mental make-up they frequently vary slightly in such characteristics as dominance, aggressiveness, etc. This has been well shown by Blatz(5) in his study of the Quintuplets. Such is the case in these twins. The twin with the hysteria is definitely the more dominant, aggressive one of the pair and accordingly she has taken a much more active part in the domestic difficulties. In addition she has been more active in attempting to better her economic status by doing small chores in the evening, often being out until late at night, and at the same time she attempted to keep up with third year high school work. This was more than she could handle and her reaction to the intolerable situation was to break down with an hysterical reaction. Her twin, who remained more in the sidelines, had no such reaction.

SUMMARY

In this paper we have presented five cases of mental abnormality of various types in one identical twin. We have attempted to show that because of the identical heredity in monozygotic twins the study of cases of this type is of importance in showing the relative rôle played by inherited and environmental factors. In four cases we have been able to determine differences in environment which we feel are important in the etiology of their condition, knowing that by the continued mental health of the other twin we have ruled out the possibility that heredity in itself was the factor behind the illness. If we look upon studies of abnormality of one identical twin as a testing ground for our present day ideas on etiology, then our results are quite in keeping with these conceptions.

I wish to take this opportunity to express my appreciation to Dr. Lionel Penrose, who first stimulated my interest in this subject and who made very valuable suggestions regarding monozygotic diagnosis. Also to Dr. Herman Hogben who very kindly reviewed my material and to Dr. Madge Machlin who was responsible for obtaining one of the cases included in this paper.

BIBLIOGRAPHY

1. Herman, L., and Hogben, L.: The intellectual resemblance of twins. Proc. Roy. Soc. Edinburgh, **53**: 105, 1932.

2. Jenkins, R. L.: Dissimilar identical twins. Am. J. Orthopsych., **5**: 39, 1935.

3. Kasanin, J.: A case of schizophrenia in only one of identical twins. Am. J. Psychiat., **91**: 21, 1934.

4. McBroom, and Gray, R. C.: Idiopathic epilepsy in identical twins. Arch. Neurol. Psychiat., **31**: 824, 1934.

5. Newman, H. H.: Multiple human births. Doubleday Doran & Co. Inc., New York, 1940.

6. Newman, H. H., Freeman, F. N., and Holzinger, K. J.: Twins. Univ. of Chicago Press, Chicago, Ill., 1937.

7. Reed, G. E.: Uniovular twins; schizophrenia and tuberculosis. C. M. A. J., **32**: 180, 1935.

8. Rife, D. C.: Genetic studies in monozygotic twins. J. Hered., **24**: 339, 1935.

9. Rife, D. C.: Genetic studies in monozygotic twins. J. Hered., **24**: 407, 1933.

10. Guthrie, R. H., and Lebowity, W. H.: Epilepsy in identical twins. J. Nerv. Ment. Dis., **81**: 388, 1935.

11. Rosanoff, A. J.: Manual of psychiatry and mental hygiene. John Wiley & Sons, New York, 1938.

12. Rosanoff, A. J., Handy, L. M., and Plessett, I. R.: The etiology of mental deficiency with special reference to its occurrence in twins. Psychol. Monog., **48**: 1, 1937.

13. Rosanoff, A. J., Handy, L. M., Plessett, I. R., and Brush, S.: The Etiology of so-called schizophrenic psychoses. Am. J. Psychiat., **91**: 247, 1934.

14. Rosanoff, A. J., Handy, L. M., and Rosanoff, J. R.: Etiology of epilepsy. Arch. Neurol. Psychiat., **31**: 1165, 1931.

15. Rosanoff, A. J., Rosanoff, J. R., Handy, L. M., and Plessett, I. R.: Etiology of manic depressive syndromes with special reference to their occurrence in twins. Am. J. Psychiat., **91**: 725, 1935.

16. Rosanoff, A. J., Handy, L. M., and Plessett, J. P.: Mental disorders in triplets. Am. J. Psychiat., **95**: 1139, 1939.

PSYCHIATRIC OBSERVATIONS ON CHILDREN WITH ABDOMINAL PAIN[1]

By JOHN P. LAMBERT, M.D., Katonah, N. Y.

Pediatricians are often confronted with the complaint of stomach ache as the principal reason for which children are brought to them by their parents. Sometimes no physical basis can be detected, the pain subsides eventually, and the condition is usually diagnosed as "abdominal pain, unexplained." A review of the records of over two hundred children in whom the abdominal pain was unexplained revealed that in a fourth of them there were no concomitant signs or symptoms of organic disease. Many times their unexplained pains are attributed to psychogenic causes, more frequently by exclusion than through compilation of positive findings.

During 1939 and 1940 an effort was made at the Children's Psychiatric Clinic to study, in collaboration with the pediatricians, those children coming to Harriet Lane Home, Johns Hopkins Hospital with a complaint of abdominal pain. In the absence of any acute medical or surgical condition, these children were referred for psychiatric study in which a comprehensive and living picture of each child was obtained from various sources. Twenty-five children were seen in whom the presenting complaint was in the nature of abdominal pain. There were ten boys and fifteen girls, ranging in age from four to fourteen years.

Each child received a complete and careful physical examination, but no attempt was made to run through the gamut of diagnostic procedures. There were no strikingly unusual physical findings, and the general nutritional status was satisfactory.

In three children a clinical diagnosis of spastic colon was made and substantiated in two by x-ray studies. In two girls there was evidence, on history and examination, of inactive rheumatic heart disease. One of these girls, while being followed in the psychiatric clinic, developed Sydenham's chorea.

Inasmuch as sometimes abdominal pains have been considered to be an early sign of epilepsy or an epileptic equivalent, an electroencephalogram was obtained on as many children as was practicable. In three children with a history of convulsions, the EEGs showed marked paroxysmal dysrhythmias in keeping with the clinical diagnosis of "convulsive disorder" (epilepsy). The EEGs in two other children were interpreted as pattern usually seen in "petit mal." Seven other EEGs showed some degree of dysrhythmia. The significance of this is open to question since recent work tends to show the EEG patterns in children are not well established and do not carry the same diagnostic implications as in adults.

The intellectual capacities of the children as measured by performance, ranged from an I. Q. of 80 to an I. Q. of 143, with half of the group having I. Q.s above 110.

There was always a history of more than one episode of abdominal pain. In some children, attacks occurred every few months over a period of years, in others, at more frequent intervals. One girl would have several dozen mild attacks over a two or three day period and then have no more for several weeks. The pain was usually in the umbilical region and of a nondescript nature. For example, "My tummy hurts," "It's a funny feeling," "I think I'm going to be sick." The episode seldom lasted more than a few minutes and, on occasion, each child had vomited. One boy vomited so severely as to necessitate intravenous replacement of fluids.

While the leading complaint had to do with abdominal pain, there were always other complaints as the history unfolded. The most common ones dealt with eating and sleeping habits. School difficulties were often cited. One mother said, "She could

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Va., May 5-9, 1941.

From the Children's Psychiatric Clinic, Harriet Lane Home, Johns Hopkins Hospital, Baltimore, Md.

do the work but is just lazy." A teacher reported, "He's bright but is so indifferent in school." Parents often commented on the manner in which a child adjusted to other children. They would complain, "He won't play with his sisters," or "She doesn't play with other kids." Many parents told of the child crying or having temper tantrums, and in most instances "irritability," "shyness," and "restlessness" were observed.

The history revealed relatively difficult home situations for the majority of the patients. Over a third of the children came from a home in which there was no parent or only one parent. In several other homes, either the mother or father was away so much of the time that such settings were figuratively "broken homes." In reply to questions about a child's attitudes and feelings, parents would say such things as, "He doesn't complain ever and it's hard to find out how he feels," "She just stares at me when I tease her," "I can tell something is wrong by the way he doesn't play and the way he looks." There were only three children about whom fearfulness was noted as a complaint. As will be seen later, this is not at all in keeping with what the children expressed in their interview.

Sometimes parental attitudes were vividly depicted through recording the history word for word. One mother introduced her child with this, "He has tummy aches; you know he lies terrible and it takes an hour and half to break him down." There were many examples of parental oversolicitude, as the mother who escorted her ten year old boy to and from school and the parents who bestowed an invalid's existence on a healthy boy. There were also instances of parental hostility and rejection, as the mother who said of her daughter, "She is just a source of worry to me all the time." A few parents openly said the child was an unwanted one. For the most part, however, parents were so immersed in themselves, in their tensions and strifes, that they were unaware of the child's daily needs and problems.

Each child was seen alone and given an opportunity to tell the history in his or her own words, and to describe feelings, emotions and attitudes to a non-judging listener. For the most part the patients were quite spontaneous and gave rather full stories of their personal lives and situational settings. In several children who were not very responsive in direct verbal interviews, a vivid portrayal of attitudes and feelings was given on the child's own initiative through the medium of play (dolls and drawings) as outlined by Conn [2] and others.

Many of the children explained their abdominal pain spontaneously. One child, on being asked, "What is your trouble?", replied, "When the gas and electric bill is due I get scared, thinking it might be cut off, and have a tummy ache." Other children did not have such a ready explanation but every child did associate or correlate the pain with emotional attitudes or feelings. One boy spoke as follows, "I haven't been feeling very well—these stomach and back pains—I'm rather restless at night—you know, it's quite convenient to sleep with mother; she's right at hand to get me medicine if I'm in pain in the night—it wakes me up—I have scary dreams of a man taking me away." An often-married woman brought in her only child. This seven year old girl was very spontaneous and friendly during the Binet examination; but refused to discuss anything regarding her personal or home life. The girl became quite talkative with the dolls in a play interview. I quote an excerpt of her conversation:

> The father doll: "I wish I had a boy instead of a girl."
>
> "Perhaps we can," replied the mother doll.
>
> The child stepped out of character to remark, "That's just like me; I have a stepdaddy; I don't like to call him stepdaddy, just daddy."
>
> Then pointing to the father doll, the patient said, "He beats the girl because she spills some milk—she feels bad because he don't like her—she's scared and it makes her stomach hurt."

In contrast to what the parents reported all of the children, including those with demonstrable organic pathology, described feelings of fear, anxiety and insecurity, using terms such as "scary," "spooky" and "worried," if not more directly as "I get scared in the dark." There were fears of fire, kidnapping, getting hurt, failing in school and of parents being hurt. Dreams

[2] Conn, J. H.: Mental Hygiene, 23: 49 (Jan.) 1939.

of a similar nature occurred in many of the group and often accounted for disturbed sleep. An eight year old girl told of a dream in which "Lightning struck the house and I woke up with a pain." In sixteen patients the central theme of the fears revolved about the home situation. A twelve year old boy, instead of going out as he planned, was told by his oversolicitous mother to rake and burn the leaves. In the midst of carrying out her orders, he suddenly ran to his mother and complained of stomach ache. Later in discussing the episode, this child said, "I was going to ride my bike, but had to burn the leaves; they flared up and I was scared it would spread and burn the house and my mother would get hurt."

Many of the difficulties pertaining to school and to adjustment with other children were attributed to apprehension or anxiety. A few children told of having abdominal pain, but not complaining of it, at the time of such emotional distress. One child avoided other children since, "They teased me about my mother leaving me; sometimes it made me feel bad and my tummy hurt." Another child was preoccupied over having to transfer to a school where he didn't know anybody. He would think of "all the fun I used to have," to the detriment of his marks.

In data from parents we have noted that the children had a somewhat limited direct and outward expression of attitudes. This point is borne out by the children themselves, one of whom said, "I get mad but am scared to do anything." Feelings of resentment, rebellion and hostility were seldom expressed directly. More often the attitude appeared in the form of visceral sensations as happened in a girl who said, "When my mother wouldn't let me go, it made me excited inside and my tummy started hurting."

It would be possible to cite many examples but, instead, let us consider a single individual in her setting.

Mary at the age of nine, was referred to the Children's Psychiatric Clinic because of repeated attacks of abdominal pain. Two years previously she had been seen in the Pediatric Dispensary for the same complaint and, after a work-up, the diagnosis of "possible rheumatic heart disease" was reached. Bed rest was prescribed but not carried out too successfully. Recurring attacks of abdominal pain, in the absence of any manifest rheumatic disease led to psychiatric study. The history revealed sibling jealousy, restlessness and inattention in school with poor marks.

At home, moderately worrisome parents were struggling to clothe and feed five children. The mother, a cardiac case herself, was very oversolicitous and overanxious about Mary.

On physical examination, the child was found to have a soft apical systolic murmur. The EKG, the erythrocyte sedimentation rate, and x-ray did not indicate any definite cardiac disease.

Mary was an unhappy and apprehensive girl of superior intelligence (I. Q. 113), who said, "My tummy hurts, turns upside down; when I ride in the street car my tummy hurts, I think there might be an accident and mother might be killed." The patient described being afraid of the dark and of having abdominal pain at night and in school.

Mary's mother had not been aware of the carsickness nor did she know about the pain which occurred in school.

The mother was reassured as to Mary's being healthy and of better than average intelligence. She was urged to allow the girl to play unsupervised after school instead of lying down in the house. It was arranged that Mary return alone for interviews.

During the course of three interviews, Mary appreciated that, "It's my imagination there'll be an accident" and "I'm scaring myself." Similar dynamics explained, in part, fear of the dark and the difficulty in school. At night, Mary "imagined a ghost was coming to take me away—I was scared but it was just my imagination—I was scaring myself." In school, "Teacher might make me stay in the corner for talking."

At a later date, when asked, "How is your tummy?" She replied, "It doesn't hurt as often because it's my imagination that there might be an accident or a ghost was coming." At this time, she spontaneously told of having been "mad at mother because she wouldn't let me play."

Three weeks after the initial psychiatric contact, the mother reported, "I don't know what it is but she's better all around; sleeps better and is in better spirits; doesn't cry—she's so much better I don't have to keep after her all the time."

The patient and family seemed to be adjusting quite satisfactorily when Mary developed Sydenham's chorea which necessitated hospitalization. She became difficult to manage on the ward, complained of abdominal pain and vomited. These features promptly subsided after a discussion of her responsibility for her attitudes. She remarked, "It's because I don't like it here."

Her subsequent course has been a slow, undisturbing and undisturbed convalescence.

From the observations in this group of twenty-five children one can retrace many of the steps in the development of the abdominal pain, see in part the influence of various factors, and come to some understanding of the problems involved.

It is generally accepted that pain may occur when there is visceral tension. In the present study there were some children whose visceral tensions were prolonged and involved a dysfunction of the gastro-intestinal tract, as in spastic colitis. More often the children had episodic exacerbations of visceral tension. In the twenty-five children studied it seems the abdominal pain was the visceral accompaniment of emotional disturbance. Although it was the pain, not an emotional attitude, that was the presenting complaint; all the children, including those with organic pathology, associated the pains with emotions—often this correlation was spontaneous.

The attitudes associated with abdominal pain were generally in the nature of fear, anxiety and resentment; and in most instances arose in relation to the home setting. Few of the homes were conducive to the development of security. Parents were often unaware of the child's daily needs and problems and there were many broken homes, eight times more frequent than in a control group (400 consecutive admissions to the clinic). Of more importance however is the way in which the individual child reacted to his home setting. Many of the patients did not seem to express feelings about the home openly and directly to the same extent that the majority of children do. The patients would tell of having been afraid to show how they felt and parents would report their inability to know how the child felt. Support of this is found in two points: (1) Parental observations of fearfulness occurred three times more frequently in a control group than was the case for our patients. (2) Following therapy, there were some reports that children were more frank and open in their attitudes. On a follow up visit, one mother reported, "He is fine; no more trouble with his stomach but he is getting impertinent."

The findings in so far as this group is concerned seem to indicate that the abdominal pain occurred when the child was unable to show directly certain attitudes concerning a difficult home situation.

However, the abdominal pain was only part of the picture. The associated complaints were equally important and can not be disregarded. Actually in this group the specific behavior disorders were from three to five times more frequent than in the control group. It seemed parents were often so immersed in their own problems that behavior disorders in the child were less disturbing than the somatic complaint of pain. One can thus understand why the presenting complaint of abdominal pain is not heard very often in a psychiatric clinic unless there is a close integration with a pediatric service.

Treatment was pluralistic and always adapted to the individual child and his setting with consideration of the interrelated physical, intellectual, emotional and situational factors. It was often impracticable to alter materially the home setting except through work with the child. Parental attitudes were more readily modified through effecting a change in the child's behavior. The generally better than average intelligence[8] of the patients was a distinct asset in work with them. They were able to verbalize their difficulties and contributed much to our understanding of the problems. An attempt was made to have the child trace out the unique dynamic features of his difficulties and successes; to understand what he had contributed to situations; and learn to accept at least his share of responsibility for what was going on in his daily life.

There have been varying degrees of improvement in all these patients. Some continue to have pain, others are free of pain, many do not present as many problems as when first seen in the clinic.

In conclusion I should like to emphasize that diagnosis will emerge, not by exclusion but through positive findings when there is comprehensive consideration of the individual and his setting.

[8] Over 50 per cent of the children studied in this group had I. Q.s above 110 and none were below 80. Less than 1 per cent of a control were above 110 and 38 per cent were below 80. The control group was made up of 1000 consecutive admissions to the Children's Psychiatric Clinic.

ORDINAL POSITION AND SCHIZOPHRENIA[1]

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No psychiatric case study can be considered complete unless it includes an investigation of the patient's orbit within the family constellation. One must investigate not only patient-parent relationships but sibling inter-relationships as well. The present study was undertaken for the purpose of investigating the significance of such relationship. The data used were obtained from 500 schizophrenics studied in The Neuropsychiatric Institute and subsequently followed over a sufficiently long period of time to determine conclusively the diagnosis and the course of the illness. After twins and cases with inadequate histories were eliminated, there remained 442 satisfactory for study purposes. An adequate control series was obtained by determining the sibling position of 500 admissions to the general hospital chosen at random. Here again it was considered necessary to eliminate twins, leaving 495. The admissions to the general hospital, as well as those to The Neuropsychiatric Institute, come from the state as a whole and accordingly represent quite identical social strata.

The importance of stress between siblings has long been recognized in individual instances and from time to time efforts have been made to form generalizations on this subject. Because of the different methods of approach and the difficulty of gathering data with satisfactory controls the conclusions which have been reached are at great variance. For example, Hug-Hellmuth(1) is inclined to stress the insecurity felt by the middle child, whereas Adler(2) emphasizes the handicaps of the eldest. Brill(3), on the other hand, points to the handicaps which the only and youngest children carry secondary to the over solicitude showered upon them. Malzberg(4) did not find any relationship between birth order and the incidence of manic-depressive and schizophrenic psychoses. Despite these varying opinions, there has been a growing tendency to consider stress as greatest with the eldest child and least with the only child. In order to determine if our data show any relationship between ordinal position and schizophrenia various factors of behavior, personality and adjustment have been tabulated separately for oldest, youngest, middle and only children.

TABLE 1

POSITIONAL DISTRIBUTION OF CONTROL AND STUDY SERIES

	Control series		Study series	
	No.	%	No.	%
Oldest child	127	25.7	98	22.2
Youngest child	101	20.4	83	18.8
Middle child	222	44.8	238	53.8
Only child	45	9.1	23	5.2
	495		442	

The number and percentage of patients falling in each of these classifications is presented in Table 1 for both the study and the control groups. The numbers in each classification in the study group in the table are used in the calculation of the percentages in all the later tables. (This is necessary as any patient may show none or all of the traits studied.)

This table shows that the most notable differences between the controls and the schizophrenics are in the middle and only children. These findings would tend to support the view that the only child makes a better adjustment. This is of particular interest in consideration of the findings of Goodenough and Leahy(5). Using the rating device employed by Blanton they found the only child definitely less introverted and less seclusive than children in other ordinal positions. As these two traits are characteristically schizoid one would expect to find schizophrenia in a smaller percentage

[1] From The Neuropsychiatric Institute of the University Hospital, Ann Arbor, Michigan.

This work is a part of the Research Project in Dementia Præcox done under a grant from the Supreme Council of Thirty-third Degree Northern Masonic Jurisdiction and National Committee for Mental Hygiene.

of only children, an assumption supported by the present study. The higher incidence of the disorder in the middle child does not seem to be supported by any statistical study of personality traits in normal children. It is in keeping with the above-mentioned opinion of Hug-Hellmuth and does suggest that the middle child is subjected to more stress than has been supposed. According to traditional beliefs the eldest should show the highest incidence of mental disease. Schuler(6) found this to be the case in a group of paranoid schizophrenics, yet the present statistics offer no support for this thesis.

As the parent-child relationship is of unparalleled importance in the adjustment during childhood, one might expect to find some significant trend among pre-schizophrenics. Collection of reliable data in this regard is extremely difficult and the results obtained very questionable. Two social investigators might arrive at quite different conclusions after study of the same case, and psychiatric study might yield still different results. Furthermore, control data in this field are not at this time available. The statistics presented in Table 2 are not considered satisfactory for comparison with any other similar findings but do offer some evaluation of the attachments and antagonisms of the various ordinal positions. They suggest that the only child in this group is less inclined to strong home ties but this difference is not significant in view of the limited number of only children under consideration. For the same reason the attachments and antagonisms of the only child, though differing slightly from the others, are not important. The most striking finding is the similarity of percentages manifested in the entire group, irrespective of ordinal position.

The incidence of neuropathic traits seems to vary widely according to the investigator and according to the trait studied. Goodenough and Leahy(5) found temper tantrums common in only children whereas Wile and Jones(7) found the lowest incidence in this ordinal position in a series of behavior disorders. In contrast to this, they found nail-biting most frequent in youngest and only children; enuresis in only and middle; speech defect in middle; and other wide variations. In the pre-schizophrenic personality these discrepancies seem to be smoothed out. The differences demonstrated in Table 3 are very slight with one questionable exception. Enuresis is seemingly more prevalent in the eldest, yet not strikingly more frequent than in the middle child. Although fewer of the oldest siblings were entirely free from neuropathic traits the table tends to emphasize similarities rather than differences in the ordinal position in a series suffering from behavior disorders.

In reviewing the educational progress and adjustment (Table 4) the only child seemed to have had some advantages. The percentage achieving average progress was nearly double that of the remainder of the group. This is somewhat offset by the small number of only children included in the study and cannot be considered as absolute, yet a total of 90 per cent of this group achieved average or superior progress. A noteworthy feature in the school adjustment of the eldest children is the small percentage of good mixers, which is seen to be much below that of any other group. If one considers activity in organizations as a manifestation of good adjustment, certainly the

TABLE 2

ATTACHMENTS AND ANTAGONISMS IN VARIOUS SIBLING POSITIONS

(M = male, F = female, T = total)

	Oldest child				Youngest child				Middle child				Only child			
	M	F	T	%	M	F	T	%	M	F	T	%	M	F	T	%
Strong attachment to mother	13	7	20	20	6	7	13	16	23	10	33	14	4	2	6	26
Strong attachment to father	6	0	6	6	1	1	2	2	2	10	12	5	2	0	2	9
Strong attachment to sibling	1	3	4	4	3	6	9	11	11	12	23	10	0	0	0	0
Strong antagonism to mother	1	5	6	6	0	2	2	2	2	5	7	3	0	0	0	0
Strong antagonism to father	6	7	13	13	2	2	4	5	16	14	30	13	2	2	4	17
Strong antagonism to sibling	2	3	5	5	1	3	4	5	8	11	19	8	0	0	0	0
Strong home ties	30	22	52	52	25	21	46	55	60	83	149	63	8	3	11	48

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entire study group demonstrated a glaring weakness in this regard. The fact that but 1-4 per cent of the various sub-groups showed any such ability or tendency is in keeping with the traditional schizoid personality alleged to be typically pre-schizophrenic. Considering these features of school adjustment which reflect aggressive traits, such as athletic ability, social achievement, truancy and disciplinary difficulties, differences between the various sub-groups. The slightly higher percentage of schizoid-sensitive-retiring individuals amongst the only children is insignificant in view of the small number in this group.

Table 7 is of interest in comparison with reports of the prognosis with the use of shock therapy. However, it fails to demonstrate any differences between the various sub-groups, the recovery rate being extremely small in all. The high percentage of cases that progressed to a chronic phase may well be due to the care in diagnosis and the selection of cases in which there was no question about diagnosis even after a period of several years.

TABLE 3

NEUROPATHIC TRAITS

Neuropathic traits	Oldest child				Youngest child				Middle child				Only child			
	M	F	T	%	M	F	T	%	M	F	T	%	M	F	T	%
Speech impediment	5	0	5	5	1	1	2	2	7	6	13	5	0	0	0	0
Tics and mannerisms	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
Temper tantrums	4	6	10	10	1	4	5	6	5	6	11	5	1	0	1	4
Enuresis	6	12	18	18	3	2	5	6	17	14	31	13	0	1	1	4
Sleep walking and talking	4	2	6	6	1	1	2	2	4	1	5	2	1	0	1	4
Night terrors	2	2	4	4	0	2	2	2	3	2	5	2	1	2	3	13
Other neuropathic traits	11	11	22	22	5	5	10	12	12	19	31	13	4	2	6	26
No neuropathic traits	18	14	32	33	20	16	36	43	41	54	95	40	6	4	10	43

TABLE 4

EDUCATIONAL PROGRESS AND ADJUSTMENT

Educational progress and adjustment	Oldest child				Youngest child				Middle child				Only child			
	M	F	T	%	M	F	T	%	M	F	T	%	M	F	T	%
Superior	5	6	11	11	4	2	6	7	6	15	21	9	0	1	1	4
Average	19	23	42	43	21	18	39	47	43	69	112	47	12	8	20	87
Poor progress	13	12	25	25	8	13	21	25	42	22	64	27	2	1	3	13
Poor mixer	27	29	56	57	21	16	37	45	50	49	99	42	7	1	8	35
Good mixer	5	8	13	13	11	7	18	22	29	31	60	25	3	4	7	30
Social disabilities	23	23	46	47	14	17	31	37	41	45	86	36	7	2	9	39
Social abilities	4	4	8	8	3	3	6	7	5	5	10	5	1	3	4	17
Poor interest	3	3	6	6	3	1	4	5	14	5	19	8	0	0	0	0
Good athletic achievement	10	7	17	17	5	1	6	7	28	12	40	17	1	1	2	9
Disciplinary problem	1	1	2	2	0	0	0	0	7	2	9	5	0	0	0	0
Active in organizations	0	1	1	1	2	0	2	2	8	3	11	5	1	0	1	4
Truancy	3	1	4	4	2	1	3	4	6	0	6	3	0	0	0	0
Unusual classmate or teacher attachment	1	0	1	1	0	2	2	2	0	0	0	0	0	0	0	0

the entire study group is found to be woefully weak and passive.

The absence of aggressiveness manifested in the school adjustment is again reflected in Table 5 covering delinquencies. Positive findings are so limited in number that it is impossible to make comparisons between sub-groups.

In view of the lack of aggressiveness that characterizes the group as a whole one would expect to find a high percentage of schizoid individuals. This is definitely emphasized by the statistics presented in Table 6. Here again there are practically no

CONCLUSION

From this study it appears that sibling position plays no important part in the development of schizophrenia. There is some evidence to show that the stress to which the middle child is subjected may increase

the incidence of the disorder in children occupying this ordinal position. The only child is not subjected to sibling stress and is accordingly slightly less likely to develop schizophrenia. The study as a whole indicates that this disorder is prone to occur in a certain characteristic personality pattern, the incidence of which is approximately the same in all siblings regardless of their position in the family.

TABLE 5

DELINQUENCY

	Oldest child				Youngest child				Middle child				Only child			
	M	F	T	%	M	F	T	%	M	F	T	%	M	F	T	%
Minor delinquencies:																
Lying	0	0	0	0	0	0	0	0	1	0	1	½	1	0	1	4
Incorrigibility at home	0	1	1	1	0	0	0	0	0	2	2	1	0	0	0	0
Cruelty and sadistic acts	0	0	0	0	0	0	0	0	2	0	2	1	0	0	0	0
Petty pilfering	2	1	3	3	2	2	4	5	4	1	5	2	0	0	0	0
Others	2	1	3	3	2	0	2	2	8	0	8	3	0	0	0	0
Major delinquencies:																
Stealing	1	0	1	1	2	0	2	2	4	0	4	2	0	0	0	0
Arson	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forgery	1	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0
Uttering and publishing	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0
Breaking and entering	2	0	2	2	0	0	0	0	1	0	1	½	0	0	0	0
Others	3	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 6

TEMPERAMENT

	Oldest child				Youngest child				Middle child				Only child			
	M	F	T	%	M	F	T	%	M	F	T	%	M	F	T	%
Schizoid-sensitive and retiring	31	24	55	56	25	20	45	54	59	73	132	55	10	5	15	65
Schizoid-cold and indifferent	5	5	10	10	0	3	3	3	6	9	15	6	0	1	1	4
Syntonic-active	6	6	12	12	6	4	10	12	16	12	28	12	1	0	1	4
Syntonic-reserved and tender	0	1	1	1	1	2	3	4	4	6	10	4	0	0	0	0
Explosive	1	1	2	2	0	2	2	2	3	4	7	3	1	1	2	9
Irritable	2	4	6	6	0	5	5	6	10	4	14	6	0	0	0	0
Anxious, apprehensive	0	1	1	1	0	2	2	2	1	1	2	1	0	1	1	4
Mixed	2	6	8	8	2	3	5	6	13	3	16	7	2	0	2	9

TABLE 7

OUTCOME OF DISORDER

	Oldest child				Youngest child				Middle child				Only child			
	M	F	T	%	M	F	T	%	M	F	T	%	M	F	T	%
Recovery	2	4	6	6	1	4	5	6	5	10	15	6	1	2	3	13
Partial recovery	11	4	15	16	9	7	16	19	19	18	37	16	2	2	4	17
Progression to chronic phase	40	39	79	81	35	24	59	71	77	96	173	73	9	7	16	70

BIBLIOGRAPHY

1. Hug-Hellmuth, H. von: Mittleren Kinde. Imago, 7:93, 1921.

2. Adler, A.: Characteristics of the first, second, third children. Children, 3: 14, 1926.

3. Brill, A. A.: Psychoanalysis, its theories and its practical applications. Philadelphia, Saunders, 1914.

4. Malzberg, B.: Is birth order related to the incidence of mental disease. Am. J. Phys. Anthrop., 24:91, 1938.

5. Goodenough, F. L. and Leahy, A. M.: The effect of certain family relationships upon the development of personality. J. Genet. Psychol., 34:45, 1927.

6. Schuler, E. A.: The relationship of birth control order and fraternal position to incidence of insanity. Am. J. Sociol., 36:28, 1930.

7. Wile, Ira S. and Jones, Ann B.: Ordinal position and the behavior disorders of young children. J. Genet. Psychol., 51:61, 1937.

DISORGANIZING FACTORS OF INFANT PERSONALITY[1]

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In making prolonged studies of the reactions characteristic of young infants, by far the most striking and consistent phenomenon encountered is the tendency, latent or overt, toward functional disorganization. It is a well known fact that trivial irregularities in the personal care and handling of a baby may bring about disturbances of eating, sleeping and elimination. It is not so well known that in certain sensitive or poorly organized infants these disturbances may affect permanently the motor and psychic organization of the child, and in certain cases, may even threaten life.

This characteristic instability, though particularly strong in the first three months of life, before the psychic functions are definitely in evidence, continues to manifest itself until well into the second year when speech and locomotion are established. The infant is in a condition of potential danger for a long period, probably due to the slow development and organization of his nervous system. The "danger" is on the one hand that of sudden or premature separation from the mother or of a poor relationship to the mother; on the other, it is the mounting tension of inner hungers. By this is meant the child's need for nutriment with inability at times to assimilate food, his need for oxygen which he may be unable to satisfy because of lack of development of the breathing mechanism.

In our research program we have attempted to study and clarify the essential experiences of the infant which may distort fundamental behavior patterns and thus disturb the orderly development of the child's personality, during this early period of forebrain incompleteness.

Three are outstanding: the first is connected with the management of sucking. There is a necessity for frequent sucking periods which are not limited or interrupted, the intervals carefully regulated to suit the need of the individual infant. Aside from the matter of food intake, we have been able to establish the fact that every young infant must have a minimum sucking time of two hours a day (the details of this I have taken up in a previous paper). The second factor is that of not attempting to train the functions of elimination, at least until the child can sit alone securely and has acquired a primitive sign language by means of which he can definitely make known his bodily needs. These two basic functions have an innate rhythm for each individual child which must be observed and respected since they are fundamental in the evolution of feelings of self-satisfaction and of body control and adjustment.

The third factor, which includes also the other two, is the necessity for a long and uninterrupted period of consistent and skillful "psychological mothering" by one individual (where the mother herself is not available). This must continue at least until speech is well developed and the child has acquired a feeling of self-security and voluntary control of his body equilibrium. This need of the child I have called "stimulus hunger" because of its peculiar instinctual quality and because of its close analogy to food hunger. It implies much more than the routine care and feeding of an infant. This earliest human relationship is at first in the nature of a biological symbiosis in which two organisms with essentially different needs profit by the relationship, the mother getting the satisfaction of completing the creation of her child, the infant not only receiving food but getting a primary form of experience which helps to bring his sensory nervous system into functional activity. It is a necessary supplement in human babies to the period of intra-uterine protection; and without it serious privation reactions occur which appear to be the basis of emotional disorders in the older child and in the adult.

[1] Read at the ninety-seventh annual meeting of The American Psychiatric Association, Richmond, Virginia, May 5-9, 1941.

This study was financed through the National Committee for Mental Hygiene with funds granted by the Committee on Research in Dementia Præcox founded by the Supreme Council, 33rd Degree Scottish Rite, Northern Masonic Jurisdiction, U. S. A.

The nature of this attachment between infant and mother is so elusive and yet so essential for nervous integration that it has seemed worth while to study it in great detail. Three types of sensory experience contribute to the formation of the first relationship. Of these, tactile experiences are perhaps most obvious. The sense of touch is acute about the head and face. It is best developed in the mouth. Oral sensitivity has been shown by Minkowski to exist already in the three months' fœtus. The baby gets his deepest satisfactions and his first pleasurable orientation to the outside world through the mouth and through his own sucking activity. Passively, he gets satisfaction from being held by the mother, moved about and fondled. The satisfaction of the infant which results from these forms of stimulation may be registered in improved breathing. Respiration which is characteristically shallow, unstable and inadequate in the first weeks after birth is definitely stimulated reflexly through sucking and through physical contact with the mother. Infants who do not suck vigorously do not breath deeply and those who are not held in the arms sufficiently, particularly if they are bottle fed babies, in addition to breathing disturbances often develop gastro-intestinal disorders. They become air swallowers and develop what is popularly known as colic. They have trouble with elimination or they may vomit. It seems that the tone of the gastro-intestinal tract in this early period depends in some special way on reflex stimulation from the periphery. Thus the touch of the mother has a definite, biological implication in the regulation of the breathing and nutritive functions of the child.

The sense of body position is acute in the infant at birth and holds a fundamental place in the building of the psychological tie between mother and child. If the body of the new born infant is not well supported by wrappings or if the child is suddenly picked up or moved about rapidly or violently, it reacts immediately with the startle reflex. This innate sensitivity or "fear of falling," as it has been called, tends normally to be overcome by gentle motion or rocking. The cradle and the rocking chair have a definite psychological position or usage in the first months of life. In our study of a large group of babies, we have found that many of those who do not get this form of mothering in the early months frequently substitute it themselves with head-rolling, body-rolling or other hyper-kinetic manifestations. It seems clear that the nervous system needs some sort of stimulus feeding or rhythmic vibratory movement to facilitate its development.

The third factor which comes into this elementary child-mother tie is sound. The majority of new born babies show a violent startle reaction to loud or sudden noises. After the first week of life it is evident that the human voice begins to exert a peculiarly soothing effect upon the child. We found that mothers who make a practice of speaking softly or singing to their infants while holding them have a much better relationship to the child. Sensitivity to noise tends to disappear much more rapidly from babies who are rocked and sung to judiciously than in those who are left in the isolated seclusion of the modern nursery. The developing sensory functions of the child thus get a primary focus and orientation toward the mother who either intuitively or knowingly primes these activities. Obviously, this is the foundation for a good emotional relationship later on. We have some data indicating that it has also to do with the capacity for intellectual concentration in the older child.

After the third month, approximately, the mother-child relationship takes on a distinctly new coloring. The psychic activities become rapidly evident at this time, and under favorable conditions definite awareness of familiar situations is present. Responses of appropriate smiling or crying accompanied by gross affective outbursts of joy or rage are seen. The "distance receptors," namely, the eyes and ears, have become associated with mouth activity. The infant has developed the ability to orient itself to reality through the faculties of sight and sound. Oral activity differentiates rapidly from this time on. Sucking loses some of its driving intensity and the energy which went into it begins to be displaced into smiling, crying, vocalization and chewing activity. Its grasping aspect is gradually transmitted to the hand so that the holding on or clinging of the baby is no longer done with the mouth. From this time on actual physical contact with the mother is not so

imperative as seeing and hearing. In cases where the mother comes and goes to business or to social duties or where there is a continuous shifting of nurses during these months of primary emotional development, the child becomes rapidly uneasy and fearful. The actual presence of the mother is necessary at frequent intervals and it is important that the child is active in the withdrawal or separation which follows (usually through falling asleep) and not that the mother repeatedly goes away.

In view of these facts it is astonishing to find in making a study of our modern systems of infant culture that there is a strong tendency among pediatricians and obstetricians to separate mother and child at birth and to isolate the infant into a highly sterilized and impersonal atmosphere. Any handling apart from giving necessary routine care, fondling, or anything in the nature of a tender relationship between mother and infant is definitely discouraged. There is practically no recognition of the fact that an infant has psychological needs or hungers, as well as a need for food. The sinister factors apparently responsible for this attitude are on the one hand fear of bacterial infection, on the other the dread of emotional dependency. This apprehension of the average child specialist actually brings about what might be called a psychological abortion, that is, just at the time when close contact with the mother is a necessity for facilitating nervous integration a completely unnatural separation is advised.

More subtle factors, of course, are responsible for separation between child and mother which because of their complexity are being dealt with in another paper. They concern the emotional health of the mother as determined by experience in her own childhood and by her emotional satisfaction in the marriage relationship.

Two types of reaction tend to develop gradually in young babies who have not been mothered and in those who have had adequate personal care and suddenly lose it. The first is general negativism. This may show itself locally in the oral zone in a refusal to suck, with complete loss of appetite or with failure to assimilate food. Accompanying this negative reaction to sucking one finds on close examination more or less hypertension or rigidity of all the body muscles. Arms and legs resist extension. The torso is arched slightly backward and particularly the muscles of the back of the neck are tense. This extensor reaction is at times accompanied by periods of frequent violent screaming. Another common accompaniment is breath holding or shallow breathing, and constipation. Apparently the tension in the motor system spreads readily from the skeletal to the visceral muscles.

The second type of reaction to lack of mothering and one which has still more sinister implications, is the depressive or regressive type. These infants when they are put to the breast or given the bottle make a few sucking movements in response to the stimulus situation, but quickly fall asleep. This so-called sleep soon takes on the quality of a stupor and the child does not awake for the next feeding, but has to be repeatedly tickled on the soles of the feet, shaken, spanked or chucked under the chin by the mother or nurse in order to arouse him. In a few babies who show especially poor functional organization the sucking reflex may disappear altogether and the child has to be tube-fed. Along with this oral lethargy there is a general loss of muscle tone and reflex excitability throughout the body. These infants soon develop a marked pallor and what the pediatrician describes as skin turgor is diminished. With this condition there are usually gastro-intestinal disturbances with regurgitation of food or diarrhea. Breathing is apt to be irregular with periods of apnœa. Sometimes Cheyne-Stokes respiration is seen. Hiccoughs and yawning are frequent. The close similarity of this reaction with the familiar picture of shock is obvious. However, paradoxically in young babies it is insufficient stimulation which tends to bring it about. Treatment of the condition bears out this idea. These babies are restored to normal, where this is possible, by supporting the peripheral circulation with subcutaneous injections of saline daily. Body massage and raising the foot of the bed to increase cerebral circulation are helpful. Artificial stimulation of the sucking reflex must be maintained persistently for the best results.

It seems clear that both types of reaction indicate some sort or danger threatening the

organism. If we speculate as to the meaning of this danger, it seems most probable that we are dealing with a defective blood supply to the brain which results in an anoxæmia to the rapidly developing brain cells. It appears that the muscular hypertension and hyperactivity help to bring blood into the cerebral circulation. The hyperactivity of the child appears to be also an attempt on the part of the organism to maintain contact stimulation.

After the marked increase in psychological activity in the third or fourth month of life the privation reactions of the child show a distinct change. They take on a more specific affective character and the posturing, rigidity and hyperactivity as well as the shock reactions become less evident Also visceral responses fall more and more into the background. Smiling, tears and vocalizing become prominent. At this time, outbursts of emotional excitement, which are not always well differentiated but express positive or negative feeling, are shown through the entire motor system. These outbursts quickly gain momentum if the child is not immediately soothed. Temper tantrums are frequently seen in the latter half of the first year of life. Definite anxiety becomes evident now and if carefully traced is found to be invariably connected with the fear of losing the mother or somewhat later of incurring her disapproval. The much dreaded emotional dependency of the child begins at this time. Where a child too frequently experiences a situation of perfunctory care from a mother who is going immediately away, he develops an exaggerated tendency to cling to her, while on the same basis the somewhat older child develops violent feelings of jealousy.

Babies who are suddenly weaned or who must be separated from the mother by illness or other causes have a tendency to become preoccupied with regressive activities characteristic of a previous period of development. Thumb-sucking, which continues far beyond the normal limits for such behavior, is frequent. Preoccupation with the processes of elimination often develops and the small child soon divines the fact that he can get maternal attention through these activities when it does not come in a more normal way. Some of these children react by refusing to eat. A few lose the ability to vocalize.

A brief case history with the type of symptoms which were observed in four different children will serve to illustrate some of these reactions.

Infant "A" was a normal breast fed baby cared for only by her mother. She developed splendidly until five months of age, at which time the mother was suddenly called away from home by an emergency situation. The infant was left in charge of an aunt who had been given the most minute instructions as to her care, and the pediatrician was on call. This aunt was told by the pediatrician not to take the child up from the crib because he feared that her excellent routine might be spoiled. Because of this, she was not even held for her bottle feedings. During the first days of the mother's absence no marked reactions were observed by the aunt. The child did not cry and apparently slept soundly at night. At the end of the first week she was found violently rolling from side to side in the middle of the night, and during the day she began to scratch her face. When going to sleep she rolled her head from side to side, at times with such vigor that she knocked it against the sides of the crib. This behavior continued for several weeks, and finally the child began pulling out little wisps of hair with her fingers. Another symptom developed. She retained her stools and became constipated. The aunt in desperation telegraphed the mother to come home at once. She stated afterwards that she felt sure something was mentally wrong with the baby. On the return of the mother it was, of course, too late to re-establish breast feeding but her familiar care of the child which she naturally exaggerated soon brought relief. In the course of a month, with some help and suggestions the child was completely restored to normal. One residue persisted, however, from this experience, namely, an obstinate, chronic constipation. In spite of a carefully regulated diet, this child would go four or five days without the passage of a stool. The mother came again to our study group for advice and was told not to give the infant enemas or suppositories, but to take care of the difficulty by giving the child more attention in other ways. Complete body massage daily was advised. A rocking and rolling chair was procured for her and with a great deal of loving care the condition appeared to be entirely corrected. However, this infant still suffered from the latent effects of the separation. Some months later, the mother went away for a few days rest in the country and the child was left in the care of her father and a competent nurse. The head-rolling symptom reappeared on the second night that the mother was away and the obstinate constipation re-developed. In following this child's development throug a period of four years, the same type of reaction invariably recurred if she was separated for a short time from her mother, and at the present time whenever she sees her mother put on her hat,

unless she herself has been dressed to go out, she becomes uneasy and reacts by twisting her hair.

We are reminded by the activities of this small child of some of the mourning rites of primitives who beat on their heads, tear out their hair and rock the body back and forth. Obviously this baby was too young to have any conscious awareness of missing her mother, and what we see is probably a primitive attempt to maintain a kind of stimulation given her through mothering care.

It would obviously be out of place yet to connect these early infantile experiences too definitely with the extensive personality disorders seen in the mentally ill individual. Our present research program is to make prolonged, analytic studies of several older children who present functional disorders which appear to be connected with early infantile experiences.

At the present time it must suffice merely to cite three examples of the problems for our continued investigation and for later report. One of these is a boy of ten who has no sphincter control, this condition developing during the past year. This is a highly gifted child with an I. Q. of 140. He has mood swings in which he varies from a completely passive, depressed individual to a sullen and rebellious child with outbursts of temper and screaming. At other times he takes the rôle of an infant, talks baby talk and is unable to dress himself.

A second child, age five, has become completely mute in the last year, following a number of traumatic experiences in connection with sucking, with adjusting to new forms of food, and with adjusting emotionally to other children.

A third child, age eight, is a stutterer, and also has periods when he does not speak for days at a time. During these periods, he will frequently kneel and kiss the floor, or kiss his own image in the mirror. This was an unwanted child who from birth had extremes of inconsistent mothering, complete rejection being followed by exaggerated manifestations of affection.

COMMENT

INTO THE NIGHT

A generation ago Clifford Beers launched a movement looking to the amelioration of the condition of the mentally ill patient and to the prevention of mental illness in the individual. The results of that movement have been gratifying and encouraging. But intervening world events have directed attention beyond the individual to the collectives he composes. For the manic patient or the paranoid suitable measures of treatment and of protection, for both the individual and society, have been devised; with the psychopathic criminal, whose only excuse for committing crime is that he is a psychopath, society and health agencies have not greatly concerned themselves. He is not left to follow his own vent however; the law is quite prepared to deal with him. But social psychopathy is just as real as the individual psychopathic personality, and national paranoia is the disease of our time; a government and its followers (or victims) may become a criminal psychopathic collective. For these morbid manifestations of human mentality no means of prevention have been found or even thought about very seriously.

When a small cancerous nodule is discovered in human tissues the surgeon does not treat it by appeasement; he cuts it out: but doctors of social and national health have not well learned that lesson; they have even shown themselves to be unskilful in diagnosis. Once a disease like Nazism has begun to spread, the world is faced with the desperate question: Has radical operation been attempted in time?

For we know the horrid consequences of this disease; many nations have experienced them. In part they have been set down in eloquent words by Raymond B. Fosdick, president of the Rockefeller Foundation, in his review of the year in the annual report of the Foundation for 1940. In this review there is a section which bears the caption at the head of this comment and which is here reproduced. In reading of these brutal and sordid things we have to remind ourselves that since their recording, another year of still more dreadful deeds has piled horror upon horror. The malignant disease has not been eradicated.

Here are the words of President Fosdick:

In the shadows that are deepening over Europe the lights of learning are fading one by one. The conception of knowledge as an international responsibility has vanished. The free flow of ideas across boundary lines between laboratories and universities has dried up. Everywhere the exigencies of the war have erased the possibility of intellectual and cultural life as that term was understood a few years ago.

On the Continent, as distinguished from Great Britain, the situation during the last year has rapidly deteriorated. January 1941 finds a large number of universities and institutes closed, and many others working under conditions scarcely tolerable. As German forces have moved into one country after another a definite pattern has been followed in relation to the universities and other schools. Allowed at first to continue with their work, their teaching and student activities were closely supervised by the German authorities. The supervision involved an attempt to enforce a "cultural program" similar to that already imposed by the Nazis on German institutions. Where this attempt was resisted, as it frequently was, the measures of repression adopted by the occupying authorities included the closing of the institutions, sending faculties to concentration camps, and even breaking up student demonstrations with machine guns and tanks.

In two Czechoslovak universities during the winter of 1939-40 hundreds of students were imprisoned and many were shot. Finally the universities were closed and most of the student body was deported for forced labor in Germany. In Holland in 1940, as in Poland in 1939, there were many arrests and deportation of students and professors. Similarly in the Norwegian universities the German attempts to enforce the Nazi cultural pattern have been marked by the frequent arrests and disappearances of professors and students alike. Belgium's four universities were all permitted to reopen in October, but severe restrictions were imposed upon the University of Brussels and the Catholic University of Louvain, whose library was completely and apparently deliberately destroyed by the Germans. The number of students has been greatly reduced in Belgian institutions, and the Germans are exercising close control over the teaching. In Paris, following the Armistice Day demonstration in which a number of students were machine-gunned, the University was closed for a period and the Rector dismissed.

The condition of university life and standards on the Continent is now little short of appalling. Due to flight, imprisonment, or disappearance the number of professors in institutions has been reduced by at least 50 per cent. Jewish professors in France were discharged as a result of the September decrees issued from Vichy, and similar action has been taken in other countries under German domination with the exception of Denmark. Professors residing in German-occupied territory who were known to be anti-Nazi have been taken to concentration camps or have disappeared. The same is true of German refugee scholars who had found haven in countries subsequently invaded by German troops. Similarly in the three Baltic states—Lithuania, Latvia, and Estonia—which were absorbed by Russia in June 1940, the process of converting the universities into Soviet institutions has proceeded rapidly. More than half of the professors have been removed from their positions and many of them have been imprisoned or have disappeared. The teaching programs have been completely reorganized, particularly in the social sciences.

Over all the continental universities hangs the pall of uncertainty and fear. The contact with contemporary life has been abruptly broken. Even when fundamental research is being continued, publication has largely been abandoned or postponed. In the social sciences such research as is carried on is confined to innocuous projects which have no relevancy to the present scene. Even neutral countries are under pressure to permit a totalitarian interpretation in the teaching of such subjects as economics, political science and sociology; and scholars—to quote a recent guarded letter—"exercise a certain tact and circumspection in our treatment of the most up-to-date problems."

In such surroundings scholarship withers and only through heroic struggle keeps itself alive. When the German Minister of Justice tells the Association of University Professors that the old ideal of objectivity was nonsense and that "today the German university professor must ask himself one question: does my scientific work serve the welfare of National Socialism?" he is voicing a doctrine which if broadly applied spells the end of Western scientific thought. When relativity becomes "an example of characteristically perverse Jewish thinking," and genetics is a battleground for the "Aryan theory," then the end of the day has come in which Claude Bernard could say: "I give small thought to where the truth will lead me, provided that I find it."

It is only in an atmosphere of freedom that the lamp of science and learning can be kept alight. In all the history of the race knowledge has never flowered in a subject people. It is only free men who dare to think, and it is only through free thought that the soul of a people can be kept alive.

NEWS AND NOTES

FELLOWSHIP IN EXTRAMURAL AND CHILD PSYCHIATRY.—The National Committee for Mental Hygiene announces a limited number of fellowships for training in extramural and child psychiatry. Initial selection for these fellowships is to be made by the National Committee for Mental Hygiene, by whom eligible applicants are to be recommended for appointment in selected training clinics. These fellows will spend one or two years in a selected clinic, the term and plan of the fellowship to be determined by the peculiar needs of the applicant. The training is pursued according to a definite plan related to the probable future functions of these fellows. Candidates for fellowship award should have had at least a general internship and two years of psychiatry in an approved mental hospital service, in addition to other qualities fitting them for extramural service. Since this provision of training fellowships comes in response to a definite paucity of personnel in this field, peculiarities of the demand are considered in making appointments. The stipends vary slightly with location and status of the fellow but in general range between $2000 and $2600.

Requests for further information and applications should be addressed to Dr. Milton E. Kirkpatrick, The National Committee for Mental Hygiene, 1790 Broadway, New York, N. Y.

AMERICAN ORTHOPSYCHIATRIC ASSOCIATION MEETING.—The nineteenth annual meeting of the American Orthopsychiatric Association, an organization for the study and treatment of behavior and its disorders, will be held at the Hotel Statler, Detroit, Michigan, on February 19, 20 and 21, 1942. Copies of the preliminary program will be sent upon request. A registration fee will be charged for non-members. Further information may be obtained from the Chairman of the Publicity Committee, Helen P. Langer, M. D., Vassar College, Poughkeepsie, N. Y.

PENNSYLVANIA PSYCHIATRIC SOCIETY.—William C. Porter, M. D., Lieutenant Colonel, Medical Corps, United States Army, chief of neuropsychiatric section, Walter Reed General Hospital, Washington, D. C., spoke on "Psychiatry and the National Defense" at the third annual dinner meeting of the Pennsylvania Psychiatric Society at the Bellevue-Stratford Hotel, Philadelphia, the evening of October 9, 1941. Edward A. Strecker, M. D., chairman of the department of psychiatry, Medical School, University of Pennsylvania, introduced Colonel Porter.

Henry I. Klopp, M. D., president of the Society, superintendent, Allentown State Hospital, presided and delivered the Presidential Address.

Officers for the coming year, 1941-1942, are as follows:

President: Baldwin L. Keyes, M. D., Philadelphia, professor of psychiatry, Jefferson Medical College; president-elect: George J. Wright, M. D., Pittsburgh, professor of neurology, Medical School, University of Pittsburgh; secretary-treasurer: LeRoy M. A. Maeder, M. D., Philadelphia; councillors: Ralph L. Hill, M. D., Wernersville, Henry I. Klopp, M. D., Allentown, Arthur P. Noyes, M. D., Norristown, William W. Richardson, M. D., Mercer, Thomas A. Rutherford, M. D., Waymart, George W. Smeltz, M. D., Pittsburgh, Lauren H. Smith, M. D., Philadelphia; auditors: Robert H. Israel, M. D., Warren, Howard K. Petry, M. D., Harrisburg, Charles A. Zeller, M. D., Philadelphia.

NEW MEDICAL OFFICER EXAMINATION ANNOUNCED BY CIVIL SERVICE COMMISSION.—The Government is faced with a critical need for physicians to serve as associate medical officers in the Federal civil service in such agencies as the Veterans Administration, the U. S. Public Health Service, the Indian Service, and others. Applications will be accepted until further public notice.

The examination covers three grades: associate medical officer, $3,200 a year; medical officer, $3,800 a year and senior medical officer, $4,600 a year. Applicants for the medical officer grade must have graduated

from a medical school (class A) since May 1, 1920, and for the associate grade, since May 1, 1930. No specified time limit is set for graduation for the senior grade.

No written test is required. Applicants are rated upon their education and experience. Senior medical officers must have had professional experience in one of the following: aviation medicine, cardiology, and public health (general). Qualifying optional branches for the medical officers and associate medical officers include: aviation medicine; cardiology; dermatology; eye, ear, nose, and throat (singly or combined); general practice; industrial medicine; internal medicine and diagnosis; medical pharmacology; neuropsychiatry; pathology; bacteriology, and roentgenology (singly or combined); public health; surgery; tuberculosis; urology; and cancer. The maximum age limit for all grades has been raised to fifty-three.

Applicants for the associate medical officer grade need not have had experience other than 1 year of interneship, general rotating, or in an optional branch. For this grade, applications will be accepted from persons who are now serving but who have not yet completed interneship; but they must complete their interneship before entering on duty.

Announcements and application forms may be obtained at any first- or second-class post office, or from the Civil Service Commission, Washington, D. C.

Emergency Committee on Mental Deficiency.—The emergency committee in psychology, division of anthropology and psychology, National Research Council, has appointed a subcommittee on mental deficiency. The personnel of this committee includes: Miss Florentine Hackbusch, Dr. Hyman Meltzer, Dr. George Ordahl, Dr. Rudolf Pintner, Dr. Mary Vanuxem and Dr. Edgar A. Doll, chairman. The purpose of this committee is to deal with problems of mental deficiency in relation to national defense and other problems affecting the national welfare with special reference to the current world crisis. It is expected that this committee may initiate suggestions for recognizing and dealing with social, industrial and military situations to which specific problems of feeble-mindedness may be related or in which they may be involved. This committee invites collaboration with other professional groups and individuals concerned with the same issues from related approaches.

Discussion of Mental Health, South Africa.—Dr. G. F. Langschmidt of Knysna, S. A., contributes to the *South African Medical Journal* (Sept. 27, 1941) some pertinent observations from the standpoint of "an ordinary country practitioner" on the subject of mental health and ill-health in South Africa. He estimates that functional nervous disorders or psychoneuroses account for 35 per cent of all illness; he adds that this figure rose to 40 per cent during the early part of the present war. He points out that the treatment of the bulk of these cases falls to the lot of the general practitioner, whose training has hitherto been inadequate to deal with them. "Mental disorders occupy only a very small part of our curriculum, and until recently psychology and psychopathology were unknown to the medical student."

Antipathy for mental hospitals still exists, and "is not lessened by the present-day overcrowding in these institutions."

Dr. Langschmidt offers the following suggestions:

1. Mental health should fall under one department, that of Public Health, together with other medical problems, and not under a separate department such as that of the Interior, as at present.

2. Subsidized government psychiatrists in certain parts of the country to be available for the general practitioners and the magistrates' courts. This work will eventually help to lessen the overcrowding in mental hospitals.

3. To increase the number of institutions for feeble-minded, and to institute a general inquiry into the question of imbecility, especially in those districts with a large poor community.

Bryce Hospital of Tuscaloosa, Alabama, Honors Dr. Partlow.—A meeting sponsored by the board of trustees was held at Bryce Hospital on the evening of October 29, 1941, in honor of Dr. William D. Partlow, superintendent of the Alabama State Hospitals. Addresses by Mr. Robert Jemison, Jr., vice-president of the board of trustees, Mr. Frank Fitts, Dr. John R. McClure,

Dr. J. S. McLester, Colonel H. O. Murfee and Dr. George H. Denny dealt with the activities and contributions of Dr. Partlow with respect to the City of Tuscaloosa, the University, the medical profession and the State of Alabama.

In this way fitting recognition was accorded to the work of a pioneer psychiatrist and state hospital service administrator of the South and former president of the Southern Psychiatric Association.

MENTAL HYGIENE SOCIETY OF VIRGINIA.—The fifth annual meeting of the Mental Hygiene Society of Virginia was held at the Richmond Academy of Medicine, October 29, 1941.

At the afternoon session the Hon. Jas. V. Bennett, director, Federal Bureau of Prisons, Washington, D. C., and Major Rice Youell, superintendent, Va. State Penitentiary, spoke on "Probation and Parole." Dr. Geo. S. Stevenson, medical director, National Committee for Mental Hygiene and Dr. Jos. R. Barrett, state supervisor, mental hospital out-patient clinics, discussed "Principles of the Management of the Mentally Sick." Mr. H. Minor Davis, vice-chairman of the state hospital board, and Dr. H. C. Henry, director of state hospitals, described "Present Achievements of the State Hospital Board."

At the evening meeting the speakers were Dr. Merrill Moore of Boston, "The Problem of Alcoholism"; and Dr. Foster Kennedy of New York, "The Psychobiology of Isolationism."

Officers of the Society for 1940-41: Dr. David C. Wilson, president; Wm. Shands Meacham, vice-president; Mrs. Donna B. Bemiss, secretary; W. D. Ellis, treasurer.

RESEARCH FELLOWSHIPS IN NUTRITION.—Mr. Charles H. Swift, chairman of the board of directors of Swift & Company, Chicago, announces the establishment of a series of fellowships for research in nutrition. The fellowships provide for special research to be undertaken in laboratories of universities and medical schools with funds which the company has set aside as grants in aid, beginning November 1, 1941. The fellowships will be for one year but may be renewed where the project warrants it. Dr. R. C. Newton, vice-president in charge of the company's research laboratories, will coordinate the program.

In making the announcement Mr. Swift said: "A higher level of nutrition for the better health of all Americans is an integral part of national progress. To advance fundamental knowledge of foods and to discover or develop ways to feed our nation better and make our people healthier, happier and more efficient, Swift & Company has undertaken to expand its support of nutrition research. The fellowships in nutrition are designed further to enlist the country's research talents and facilities in order to achieve the long-range objectives of the national nutrition program and the immediate aims of national defense."

THE PASSING OF DR. GREGORY.—With great regret we record the death on November 2 of Dr. Menas S. Gregory, organizer and for thirty years director of the psychiatric division of Bellevue Hospital in New York City. His death, due to a cardiac condition, occurred suddenly during a game of golf.

It was Dr. Gregory who from the early days of his administration at Bellevue pointed out the need of a well-appointed hospital with ample accommodation to serve as a receiving center for the city's mental patients. His representations at length bore fruit in the splendid new eight-story psychiatric unit which was opened in 1933.

Beside his clinical and administrative duties, Dr. Gregory was one of the most active exponents of forensic psychiatry in New York City, and was called to give evidence to determine mental status and accountability in many cases brought before the courts.

After his retirement as director he became consultant in psychiatry to Bellevue Hospital.

A more extended memorial notice will appear in a later issue of the JOURNAL.

SCIENTIFIC EXHIBITS, ATLANTIC CITY MEETING, A. M. A.—Dr. Frederick P. Moersch, representative of the Section of Nervous and Mental Diseases of the Ameri-

can Medical Association, calls attention to the fact that exhibitors desiring space in the scientific exhibits of the Section at the meeting in Atlantic City in June, 1942, should make application without delay. Requests for space should be submitted to the Chicago office of the A. M. A. before January 20, 1942. The Committee on Scientific Exhibits makes the final selection from the applications received.

Application forms and instructions may be obtained from the Chicago office, or by writing directly to Dr. Moersch, section representative, 102 Second Avenue, S. W., Rochester, Minn.

DR. WOODS, DIRECTOR IOWA STATE PSYCHOPATHIC HOSPITAL RETIRES.—On July 1, 1941, Dr. Andrew H. Woods relinquished active service as professor and head of the department of psychiatry of the College of Medicine of the State University of Iowa and as director of the Iowa State Psychopathic Hospital.

Soon after graduating in medicine from the University of Pennsylvania in 1899, Dr. Woods' interest in education in China took him to Canton, where he was one of the founders of Lingnan University. Later he was sent by the Rockefeller Foundation to organize a neurological department in their Union Medical College at Peking, where he was professor and head of the department from 1920 to 1928.

This was the last of four periods of professional work in China, and from Peking Dr. Woods went directly to his post in Iowa City. It is there that we are most familiar with his fine work, which cannot be better epitomized than by referring to his own statement of his chief professional aims, so well exemplified in his teaching and practice. These were: to promote plain language in psychiatry; to align psychiatry with the general criteria and methods of medical science; to help students to grasp the physiological basis of behavior insofar as this is demonstrable; to get rid of nebulous theorizing and mysticism in psychiatry; to develop forensic psychiatry by means of efficient clinics functioning in connection with the courts.

Retirement will provide a measure of leisure which Dr. Woods has coveted for some time and which he has so well earned. We may be sure that his wholesome influence in promoting sound psychiatric principles and services will not lapse.

PSYCHIATRIC POST IN MINNESOTA DIVISION OF INSTITUTIONS.—Dr. David E. McBroom, formerly superintendent of the Minnesota Colony for Epileptics, has been appointed to the staff of the Director of the Division of Institutions, Mr. Carl H. Swanson. This is a new post created to make available to the Director psychiatric assistance and advice in connection with the work of the Division.

Dr. McBroom's appointment was effective as of September 1, 1941.

BOOK REVIEWS

SOCIAL CASE RECORDS FROM PSYCHIATRIC CLINICS. By *Charlotte Towle.* (Chicago, Ill.: The University of Chicago Press, June 1941.)

The author states that she has prepared this book "primarily for use in my own classes." The cases have been chosen with a threefold purpose: "(1) to convey a content of knowledge in the field of human behavior; (2) to impart understanding of the utilization of psychiatric concepts in case-work practice; and (3) to promote understanding of basic case-work principles and processes utilized in a clinical setting." Of the twelve cases selected three are adults and nine are children. The three adults are women. Two of them represent anxiety states and one concerns itself with vocational guidance for a person who has been slow and bewildered in convalescence from many illnesses. The nine cases of children include such problems as parental acceptance of a defective child, parental over-solicitude for hypochondriacal complaints, parental reluctance to recognize and act on matters of habit training and disciplinary guidance. Interwoven with these problems are the usual facts of financial strains, marital dysharmonies, school entanglements, sibling jealousies, parental fears of inheritance and parental conflicts arising from a wealth of ordinary emotional sources. Their treatment comprises attention to all these specific issues as they unfold themselves. In five of these twelve cases we are told that "the social worker assumes responsibility for treatment." In the other seven cases the social worker helps the mother to decide whether she should establish a home or place her child, etc.

On examining these records it would seem that they contain nothing in content and objectives which one does not find in the record material of good family case-work, good foster care, and good pediatrics social service. The only difference is that these service workers do not assume the rôle of leadership in therapy but share its responsibilities with physicians in charge of the case. The shifting of the rôle of therapy from physician to social worker involves a philosophy of case-work which is open to question. For students of schools of social work who believe in this approach this book will be enlightening. The actual presentation of case record material contains a great deal that is dramatic and much that is repetitious to the point of monotony. For example, in twenty-three pages devoted to the social worker's "interpretation" of a four year old mental defective to his parents we have the following statements: "Father at Clinic by appointment. He blew his nose as he removed his overcoat and commented that he had a severe sinus condition. Worker was sympathetic. Father sat down and after just a moment seemed to steel himself as for a blow, remarking, 'Well, what are the results of the test?' Worker smiled and said that she had sent for the medical record." It is difficult to see how page after page of such chatty details contribute to student teaching in social case-work except in the composition of ponderous records.

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THE A B C OF CRIMINOLOGY. By *Anita M. Mühl, M. D., Ph. D.* (Melbourne, Australia: Melbourne University Press, 1941.)

The present volume is one of a considerable series published for the Australian Council for Educational Research, an organization which has been aided by the Carnegie Corporation of New York. The author, a well-trained American psychiatrist who has for many years been a student of criminology, has recently been serving as Visiting Lecturer in Psychiatry at the University of Melbourne, and has been very active in disseminating mental hygiene knowledge throughout the State of Victoria.

The volume presents 13 public lectures delivered at the University of Melbourne in 1939. The presentation is in keeping with the audience to which the lectures and the book are directed, and the subject-matter conforms to modern psychiatric tenets. Throughout the motivation is stressed, together with the possible preventive steps which might have been helpful. The importance of child guidance and recreation centres is emphasized.

The book is a sound and readable addition to the literature on criminology.

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MASOCHISM IN MODERN MAN. By *Theodor Reik.* Translated by *Beigel* and *Kurth.* (New York: Farrar and Rinehart, 1941.)

This work is a translation of the author's *Aus Leiden Freuden* (Pleasure from Suffering,) which appeared a few months ago in London (Imago Publishing Company, Ltd.)

In his classical work, *Psychopathia Sexualis,* which Dr. Krafft-Ebing, the well-known psychiatrist, published towards the end of the last century, he describes a form of masochism which he designates as "ideal." He distinguishes this variant from the other forms by saying that here "the psychical perversion remains entirely within the spheres of imagination and fancy, and no attempt at realization is made."[1] Since Freud came on the scene and showed that all so-called sexual perversions are traceable to normal roots which can be observed in childhood and—in their negative form—

[1] Psychopathia Sexualis, English translation, p. 150, Login, N. Y., 1908.

in the neurotic symptom, the term, masochism, has been broadened and now refers to a form of behavior.[2] Later, when Freud wrote a *Metapsychology of Psychoanalysis,* he returned to the problem of masochism in a very fascinating paper, *Das Ökonomische Problem des Masochismus.*[3] Without delving deeply into this work, a knowledge of which is presupposed on the part of the reader, I wish to say that Freud states that masochism can be seen in three forms: as a state which arouses sexual excitement, as an expression of feminine nature, and as a form of so-called normal behavior. He designated these three forms respectively as *erotogenic, feminine,* and *moral* masochism, and added that the first, or the pleasure in pain, also exists as a basis in the other forms.

Since the appearance of Freud's stimulating work, many of his pupils have engrossed themselves in this problem; and one finds numerous references to it in psychoanalytic literature. Two clinicians, Drs. Loewenstein and Nacht of Paris, have published a comprehensive and interesting work on the subject.[4] Following Freud's scheme, they discuss the historical, clinical, psychogenetic and therapeutic aspects of this strange phenomenon. I could not help thinking of their work when I first read the author's *Aus Leiden Freuden,* and again when I read its English translation; for Reik's book is, in a way, an extensive elaboration of the same problem. Of the two versions I would recommend the German for those who can read it. The translation leaves much to be desired in clearness, to say the least.

The author, a non-medical Freudian, crowds the book with interesting, albeit theoretical, material; yet, there is a lack of cohesion and orderliness which one seeks in clinical presentations. Theodor Reik pays great homage to his master's views on the subject, but adds: "Where greatness is concerned, one has not only the right, but the duty to use the severest scale. In this sense criticism will be as unrelenting as is due to a genius and only to him. That means at the same time that it will be a criticism with due deference." The reviewer feels that such apologetic qualifications are superfluous, to say the least, in any attempt to criticize or dilate on Freud's views. Freud never claimed that his views were too sacred to be modified, or supplemented. The author states that he has "definite reasons for changing the designation of the forms of masochism." Instead of "Freud's characterizing designation, I preferred more neutral ones related to the sphere of life in which the masochistic instinctual expressions are active. Freud's erogenous masochism seems to me only a physiological precondition for this instinctual inclination." Reik distinguishes "the main forms of sexual and social masochism, corresponding to the main spheres of life in which they are developed. As to content, those forms approximately coincide with what Freud called feminine and moral masochism" (p. 34).

I purposely have quoted the author's own words in order to show the task which he set for himself in Part I of this work, and which he develops further in the other seven parts. To do this, Reik brought forth a mass of what is for the most part interesting material; but in it he discusses more or less journalistically all sorts of topics, of which a large part could have easily been omitted without impairing in any way the value of this book. Some of his views are interesting and instructive; others are provocative and eruditionally forced. The readers of this journal, who are particularly interested in the deeper psychoanalytic problems, will find in this work some new material and viewpoints; those who are not, will find it hard reading.

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[2] "Three Contributions to the Theory of Sex," p. 579, in The Basic Writings of Sigmund Freud, The Modern Library, N. Y., 1938.

[3] *Int. Zeitschrift f. Psychoanal.* Bd. X, 1924. English translation by Riviere in Volume II of Freud's Collected Papers, Hogarth Press, London.

[4] *Le Masochisme. (Étude historique, clinique, psychogénétique et thérapeutique. Les Éditions Denoël, Paris.)*

THE MASK OF SANITY. By *Hervey Cleckley,* M. D. (St. Louis, Mo.: C. V. Mosby Co., 1941.)

Dr. Cleckley has written an interesting book and has used a lot of good case material. He writes well, with a fluency and choice of words and an eye to character detail that earmarks him as a psychiatric writer who will be heard from again.

Next time we hope he will more clearly define in his mind the group for whom his book is written, for the *Mask of Sanity* contains nothing of particular moment for the practicing psychiatrist, and at the same time it seems a bit too clinical for the average lay reader. It may appeal to those on the fringe of psychiatry.

The text of the book concerns itself with what we might term the quasi-psychopathic—the successful business man who goes off on an occasional toot and does things one might read of in Krafft-Ebing—the scientist who has a blind side to his personality and becomes involved in amorous escapades—yes, even the unadjusted psychiatrist who wallows unhappily in a sea of polymorphous perversions.

This one chapter alone might well become a bit of spicy gossip in psychiatric circles, if anybody cared and wasn't case hardened; but this particular reader didn't see any point to it so far as the lay public is concerned. Psychiatry has been hampered before this by the lack of confidence of the public and it seems too bad to foster this tendency by an unnecessarily detailed accounting of the foibles of one psychiatrist.

We are willing to forgive Dr. Cleckley however, because he does have a sprightly style—far more readable than most psychiatric writers—and we are reasonably certain that this slender volume is merely a prelude to other, more significant material.

C. C. B.

TOWARD PROFICIENT READING. By *James Alexander Hamilton.* (Claremont, California: Saunders Press, 1939.)

"This book is directed primarily toward persons beyond the high school level who wish to develop proficiency in silent reading." It "represents an attempt to provide a clear analysis of the reading process, an outline of various methods for diagnosing reading ability, and a description of training procedures which have proved successful in correcting reading faults and developing reading proficiency." The reviewer is happy to quote from the author's preface because he feels that this is one of the few books which fulfills the aims stated in the preface.

The book is concise and practical. It would be useful to either the reader who wants to improve his reading or to the teacher dealing with reading problems. The exercise and reading progress charts in the appendix provide a valuable means of utilizing the information given in the text.

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FEVER THERAPY TECHNIQUE: By *Jack R. Ewalt, M. D., Ernest H. Parsons, M. D., Stafford L. Warren, M. D.,* and *Stafford L. Osborne, M. D.* New York: Paul B. Hoeber, Inc., 1939.)

This book sets out, according to the first sentence of its introduction, "To present in a brief space, the actual technique of administering various forms of therapeutic fever." This it does very well. It is written in a straightforward manner, in simple language that any one can understand.

The four authors are well qualified by experience and training to write authoritatively. Dr. Warren and Dr. Osborne have been pioneers in both treatment and the development of modalities. Drs. Ewalt and Parsons have devoted long periods to the application of the methods.

Good descriptions are given of various methods of inducing therapeutic fever, namely; malaria, typhoid vaccine, and mechanical means, including radiant energy, high frequency currents, and the hypertherm or fever cabinet. Any one who is familiar with these methods can turn to the book for a discussion of many of the practical problems and find brief but satisfying information. Any one who has not had experience with this form of therapy may get a good insight into the problems involved, and a broad outline of methodology. It is doubtful, however, if one who has not had practical experience under experienced guidance should take this book as a sufficient guide for carrying out treatment. To be sure, therapeutic fever in its early stages had to be pioneered by individuals who had never been instructed in its use, but at the present day there are enough places where work is carried out well, so that it may be questioned whether any one should start on the basis of printed instructions alone. This is particularly true in regard to the mechanical methods.

When one has had a reasonable training this little book should stand him in great stead in many instances, and for the technician who is working under the supervision of an experienced physician it also serves an important function.

There is considerable difference of opinion in the field as to which method of fever induction is most satisfactory. Quite wisely, the authors have not attempted to answer such a problem, but rather give a description of each method.

There is relatively little to criticize in the material presented. One may question the wisdom of using sedative drugs as suggested in the book, but this, of course, is a matter of personal opinion.

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SOCIAL AND BIOLOGICAL ASPECTS OF MENTAL DISEASE. By *Benjamin Malzberg, Ph. D.* (Utica, New York; State Hospitals Press, 1940.)

The author of this volume calls attention to the unfavorable aspects of mental health in contrast to the achievements in physical health and believes that if the present trend continues, mental disease will become the foremost health problem in the country. The data presented is from the experience of New York State, where a rich body of systematized statistical information, with reference to patients in civil mental hospitals, has been accumulating for a number of years. Various chapters, of which there are 14, are revisions of brief articles published in several journals, including the *Psychiatric Quarterly, Mental Hygiene,* AMERICAN JOURNAL OF PSYCHIATRY and others.

The first chapter, which deals with the trends of mental disease, reviews a large mass of information based upon the experiences in New York State over a period of twenty-five years, from which the author concludes that the incidence of mental diseases can be adequately measured in that State and that the data indicates a relative increase in such diseases. He points out, however, that the upward trend in incidence does not imply an increase in the relative number of defective family stocks.

The second chapter deals with age and mental disease. The author concludes that the probability of mental disease is low in childhood and adolescence, rising steadily in youth and maturity, develops at a more moderate rate during the involutional period and later advances rapidly to reach a maximum in old age. The constitutional disorders are related to the early periods of life, when dementia præcox and manic-depressive psychoses manifest themselves. General paresis and the alcoholic psychoses occurring in maturity represent the combination of both physiological and social factors operating in the prime of life. Each period of life is susceptible, in large degree, to certain characteristic types of mental disease.

In the third chapter, dealing with mental diseases among urban and rural populations, the author shows that the incidence is lower in rural areas, but that there is a steady and progressive relative increase in urban population rates, which bear a relation to the size of the urban population involved; the rates of first admissions being well

in excess of that for rural areas. There was a great increase in the rate of first admissions for the senile psychoses in urban communities, being twice as great as that for rural communities. This was also true of the arteriosclerotic group, for general paresis, for alcoholic psychoses, manic-depressive psychoses and dementia præcox. The incidence of mental disease is also higher among unmarried persons. All first admissions, however, have a lower marriage rate than obtains in the general population.

The author draws a general conclusion from data available that there is no significant difference in the relative incidence of mental diseases among native and foreign whites in New York State. The rates for native born and those for foreign or mixed parentage are about the same when corrections are made for differences in age distribution.

In discussing the relation of race to mental disease, he points out that high rates were found among the Irish and the Scandinavians, it being far above the general average. He notes the wide differences in the incidence of mental diseases for several racial groups, but cautions that it is not desirable to focus attention entirely upon the matter of race, since mental disease is in part a product of culture or environmental factors. He considers it important to refrain from erecting racial theories based upon statistical differences in the incidence of mental illness. In this connection, he points out also, that excluding the case of male Scandinavians, natives of foreign parentage had lower rates of first admissions than obtained in their parental stocks. This would intimate that within one generation mental disease lowers itself very materially from that which obtains in the foreign born.

The negro population of the State of New York had an annual rate of first admissions for mental diseases twice as high as that among the white population. Dementia præcox was the leading psychosis among negroes and general paresis ranked second; manic-depressive ranked third; and alcoholic psychoses, fourth.

The author concludes that there is no direct answer as to the influence of economic factors upon mental health. Unskilled workers appear to have the highest rate of mental disease but this is complicated by social and physical selection, exercised by occupation selection. Moreover, he concludes that illiteracy does not bear a causal relation to the incidence of mental disease. Whereas mental disease may be related to intellectual retardation and to social conditions associated with lower standards of education, in either case illiteracy is a consequence and not a cause. Conditions which are responsible for illiteracy are also responsible in large degree for the presence of mental disease. With reference to vital statistics, the author concludes that the mortality rates among mental patients is three to six times as great as among the general population.

The last chapter is devoted to a discussion of the outcome of the insulin treatment of patients with dementia præcox, based upon statistical compilations. The author states, "There can be no doubt as to the efficacy of the treatment." Insulin shock therapy raised the recovery rate from approximately 4 per cent in untreated cases to 13 per cent in treated cases. It brought about a marked improvement in an additional 27 per cent, compared with only 11 per cent in the untreated group. Combining all degrees of improvement, he found that 65 per cent showed some degree of improvement after treatment with insulin, compared with only 22 in the untreated group. Rates of improvement among catatonics and paranoids were significantly higher than those of hebephrenics. There is a striking correlation between the rate of improvement and the duration of the disease before the beginning of treatment. The earlier in the course of the disease that the patient is submitted to treatment, the better is the prospect of recovery and rehabilitation. Nothing is said about the insidious onset of this disorder and the difficulty of distinguishing between incipiency and a fully developed disease.

In a summary of the results of insulin therapy, the author comments as follows: "patients with short duration of the disease prior to treatment showed the highest rates of recovery and improvement. Those considered as recovered and much improved showed the highest rates of discharge and parole and the lowest rates of relapse. There is therefore evidence that to secure the best results it is necessary to institute treatment in the very early periods of the disease. There is good reason to feel encouraged over the results obtained thus far by the use of insulin shock therapy."

W. L. T.

THE CARE OF THE PSYCHIATRIC PATIENT IN GENERAL HOSPITALS. By *Franklin G. Ebaugh, M.D.* (Chicago, Ill.: American Hospital Association, 1940.)

This monograph presents a very constructive plea for facilities for psychiatric care in the modern general hospital. The author points out that in the community the cases that are wholly or partially psychiatric outnumber all other cases combined. The advantages obtained by the incorporation of a psychiatric unit include:

(a) Improvement in the general care of all patients.

(b) Improvement in teaching facilities for interns, medical students and nurses.

(c) Abolishment of the stigma felt by the public when confined in a mental hospital.

(d) Improved facilities for medical research.

Statistics are utilized to substantiate the opinions of the author and are presented in a convincing fashion. Various types of departmental organization with their requirements and determining factors are discussed. The financial aspect of a unit of this type in a general hospital receives practical consideration, and several of the present functioning units are given as examples of financially independent departments.

The examination procedures are set forth in some detail, and the management of the psychiatric cases commonly seen in general hospitals is briefly noted. Chart No. 4, on psychotherapeutic procedures, appears slightly out of harmony with the more ele-

mentary approach adopted elsewhere in the book; and it is this elementary approach which gives the monograph its great value in placing before the profession at large the rightful place of psychiatry in the truly general hospital organization.

It is comforting to observe that this booklet is published by the Council on Professional Practice of the American Hospital Association, and that in addition *The Canadian Hospital,* official journal of the Canadian Hospital Council, has recently published an extensive review on the same monograph.

There is a copious bibliography and list of recommended reading.

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Treatment, and What Happened Afterward. By *William Healy* and *Augusta F. Bronner.* (Boston, Mass.: Judge Baker Guidance Center, 1940.)

This little pamphlet reports the later adjustment of 400 cases treated at the Judge Baker Guidance Center. Information of this sort is peculiarly welcome to psychiatrists, who are naturally interested in the adjustment of patients down the years after they have left the hospital or clinic. Following up any number of such cases is a troublesome and expensive business, and only rarely are facilities available. The Glueck studies are of course notable exceptions.

This little book is a study of the adjustment of 400 unselected cases, five to eight years after treatment at the Center. Their deviations are divided, more or less arbitrarily, into serious and mild delinquencies, and into court and non-court cases. It was found worthy of note that many instances of serious and repeated delinquencies escaped court attention for various reasons.

Many other significant comments are found in this report, such as the notation that those cases which had been diagnosed as "abnormal personalities," "unstable," "psychopathic personalities," etc., almost invariably had unfavorable careers. This is especially noteworthy as these diagnoses were made, in many cases, in the absence of actual delinquency.

There are other data in the report, which will be of interest to psychiatrists in general, and to those in particular whose work is in similar fields.

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Eine Seele die sich wiederfand. Die Autobiographie des Begründers der "Geistigen Hygiene." By *C. W. Beers.* (Basel: Benno Schwabe & Co. Verlag, 1941.)

A Mind That Found Itself by Clifford W. Beers, first published in 1908 and now in its 30th printing in the United States, is required reading for every worker in the mental and social sciences. This extraordinary book is vastly more than an autobiography and history of a mental illness recorded by the patient who had recovered; it is the scriptures of the great humanitarian campaign launched by Mr. Beers and called the Mental Hygiene Movement.

In 1934 appeared a Portuguese translation of *A Mind That Found Itself,* and in 1937 a translation into Czech; now in 1941 has appeared the first German edition, published in Switzerland. Many have doubtless wondered why a work that had attained such prominence in English-speaking countries had not been translated earlier and into more foreign languages. It is known that a number of such offers were made by European and other writers who were anxious to publish editions of the book in their own countries. Mr. Beers, always very particular in the editing of the text in the numerous English Editions, was no less particular about the quality of the translations into other languages; and many such proffered undertakings were from time to time deferred until he could be sure that he had the right translator. It is understood that a French translation has been made, carrying a foreword by André Maurois, and that the manuscript only awaits a suitable publishing opportunity.

The present edition is a translation by Otto Reuter; the foreword is a joint contribution by Dr. Heinrich Meng, professor of psychiatry at the University of Basle, and Dr. André Repond, president of the Swiss National Committee for Mental Hygiene. It has been widely and enthusiastically reviewed in German and Swiss professional periodicals, one of them referring to it as a masterpiece "deserving a place among the classics of world literature." The proceeds from the sale of the work will be devoted to furthering the mental hygiene program in Switzerland.

Professor Meng has projected a series of ten volumes under the general heading *Mental Hygiene, Science and Practice,* of which the Beers translation is volume II. The first of the series was Meng's *Preservation of Mental Health,* which appeared in 1939.

In the summer of that same year a European Congress on Mental Hygiene was held at Lugano. Twelve European countries were represented. The theme of this Congress, as a last tragic call for sanity among nations, was "Mutual Understanding and Mental Health." Hardly had the echoes of this Congress died away when from Nazi Germany the most terrible war in history was let loose upon Europe.

At this point we cannot do better than to quote from the foreword to *Eine Seele die sich wiederfand.* "Today none can foretell how the mental health of nations will suffer through this war; but none can doubt that it will impose upon mental hygiene new and enormous tasks. Moreover we realize that the injuries to mental health caused by the last war were not yet healed when the new war broke out.

"Wherefore then, despite all this, do we cherish the hope that the work of Beers will continue to bear fruit? Because he has taught us that one man was able to transform the forces of destruction—activated in psychoses—into constructive forces. Beers has placed in our hands the means by which we must seek so to guide mankind, who for thousands of years could build only to destroy, that eventually constructive energies may predominate."

C. B. F.